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OF

CLINICAL LECTURES AND ESPECIALLY PREPARED ARTICLES

ON

MEDICINE, NEUROLOGY, SURGERY, THERAPEUTICS, OBSTETRICS, PÆDIATRICS, PATHOLOGY, DERMATOLOGY, DISEASES OF THE EYE, EAR, NOSE, AND THROAT, AND OTHER TOPICS OF INTEREST TO STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION THROUGHOUT THE WORLD

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Therapeutics

REMARKS ON STRYCHNINE.[1]

BY A. JACOBI, M.D., LL.D.,

Professor of Diseases of Children in Columbia University, New York.

On the fifteen pages of close print given by H. C. Wood[2] to the discussion of strychnine there are only some brief sentences referring to the subject on which I intend to make a very few remarks.

On page 212 he says, "The full dose of strychnine produces a rise of the arterial pressure which is enormously increased during the convulsion, after which there is a very pronounced fall in the arterial pressure." Page 213: "Our knowledge of the cardiac action of strychnine is still imperfect. Although Lahousse believes that in any dose strychnine depresses the intracardiac ganglia, it is probable that the small dose has a stimulating influence upon the heart." "In regard to the action of the alkaloid upon the vagi there is much difference of statement by investigators." Page 214: "The fullest permissible doses stimulate very powerfully the respiratory centres, and also slightly increase blood-pressure by stimulation of the vasomotor centres, and probably also of the heart itself." Page 217: "Strychnine is an extremely serviceable remedy in the treatment of cardiac diseases with weakness of muscle. In mitral insufficiency we have seen it prolong life for years after the failure of digitalis, and when before its administration immediate death seemed inevitable. It should always be tried in cases of failing heart where digitalis disagrees, it not being possible at present to pick out those cases in which brilliant results are to be achieved

[1] Prepared for the Annual Meeting of the American Climatological Association, June, 1900.

[2] Therapeutics: Its Principles and Practice, eleventh edition, 1900.

by it. To be effective it must be given in rapidly ascending doses, the patient being kept, if necessary, for weeks and months on the verge of strychnine poisoning, with distinctly heightened reflexes and some muscular stiffness. Clinical experience shows that it has no cumulative action, but that the patient becomes accustomed to its use, so that a grain a day may finally be given without any serious effects."

The German literature does not favor strychnine. The latest text-books of Tappeiner (1899), of Penzoldt (1900), the great cyclopædia of Liebreich (1894), and the pharmaco-therapeutics of Kobert (1897) contain but very few remarks. We learn that strychnine retards the pulse and increases blood-pressure by stimulating the centres of the vagus and the vasomotors, but that it has no prominent therapeutic effect except occasionally in partial peripheral paralysis, in the psychical and nervous disorders of chronic alcoholism, in incontinence of the bladder, in amblyopia and amaurosis unattended with serious anatomical disorders, and in poisoning with chloroform or morphine. We are also told that a cumulative effect has sometimes been observed after many days, that poisoning has occurred from medicinal doses injected in diphtheritic paralysis or administered during cardiac diseases, that now and then the secretion of urine is impeded, and that occasionally unexpected poisoning has taken place.

In the *Aerztl. sachverständ. Zeit.* of August 1, 1900, for instance, Otto Jonas reported the case of a child of two and a quarter years that took two tablespoonfuls of a proprietary syrup of the hypophosphites which was advertised to contain some strychnine (0.001 in one teaspoonful) with poisonous effect.

In a similar manner the French literature disposes of strychnine and its cardiac effects with a few words. Even G. M. Debove and Ch. Achard[1] have but little to say on the subject of strychnine in cardiac diseases. In their opinion it is observed to be a general and therefore a cardiac nerve tonic, and to influence the myocardium particularly. It diminishes blood-pressure and retards the action of the heart; even in small doses (Lahousse) it paralyzes the intracardiac motory centres, and in large doses, the terminal fibres of the pneumogastric. It is recommended in three daily doses of a half

[1] Manuel de thérap. méd., 1900, vol. i. p. 444.

or of one milligramme for valvular lesions in the period of compensation. Huchard combines it with sparteine.

The English literature—for instance, I. Mitchell Bruce's "Principles of Treatment," 1899—treats the results of strychnine medication with more appreciation.

The daily practice of American physicians with whom I come in contact and whose cases I read gives no scanty recognition to strychnine in all sorts of diseases. I seldom meet a case of cardiac disorder or of anæmia or of debility, no matter how caused, whether localized or general, or of collapse, in which strychnine has not been given long and extensively. Indeed, while formerly it was almost impossible to find such a case that was not attended by the use of digitalis, strychnine is now considered the sheet-anchor. Such a dictum as that quoted from Wood, where he says that strychnine kept alive where digitalis had no effect, is quite capable of imbuing the profession with the belief in the identity of the two drugs. There is, however, no such identity.

When therapeutic measures are selected for diseases of the heart, we should not overlook the complex nature of the anatomy, the physiology, and the pathology of the organ. The muscle, the pericardium and endocardium, the blood-vessels, or the innervation may be faulty. Part of the latter is controlled by centres located in the muscular substance. They are Bidder's and Remak's ganglia connected by nervous plexuses. They are mostly found in the septæ of the atria and in the boundary between them and the ventricles.

Until a short time ago all the cardiac ganglia were believed to be motory organs. In a discussion some years ago before the Association of American Physicians that opinion was upheld, and appeared to be sustained by a paper published in Virchow's *Archiv,* vol. lxxiv., written by Putjatin in 1878. But, according to the researches of His and Romberg,[1] it seems to be proved that the ganglia come from the sympathetic plexus. Now, the sympathetic ganglia were demonstrated by O'nodi [2] to be derived from the spinal ganglia, which are exclusively sensitive. That is why the sympathetic and the cardiac ganglia should be sensitive only,[3] provided

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[1] Arbeiten aus d. med. Klinik zu Leipzig.
[2] Arch. f. mikrosk. Anat., 1886, vol. xxii.
[3] A. Hoffmann, Pathologie und Therapie der Herzneurosen, 1901, p. 14.

O'nodi's results are confirmed, which is demanded by the bewildering complexity of the anatomy and physiology of the sympathetic nerve in general.

Coördinate in importance with the ganglia, if they be motory at all, the pneumogastric nerve and branches of the sympathetic control the action of the heart. The cardiac branches of the former have mainly an inhibitory action, but contain accelerating fibres also; one of the upper cardiac branches is a depressor which diminishes the tone of the blood-vessels and arterial blood-pressure; its pericardial branches carry sensitive fibres. The sympathetic nerve is known to be sensitive, secretory, motory, vasomotory, vasodilatory, inhibitory, accelerating, and trophic. It sends accelerating branches from its cervical portion directly to the heart. There are many communicating branches between this and the cerebrospinal nerves. In this way the blood-vessels, the muscular layers of which are thus completely controlled, are influenced in the most various ways, which are seldom entirely understood in an individual case. But there is one fact that is easily appreciated,—viz., that in most cases it is utterly impossible to be quite certain of the correctness of our remedial indications in the diseases of an organ with such an inordinately complex innervation. Nor are these difficulties diminished or obviated by the heart muscle, for it is rarely diseased without some endocardial or pericardial complication. The results of modern research tempt us often—indeed, should tempt us—to make the diagnosis of our forefathers, "carditis," more frequently than that of an isolated myocarditis, endocarditis, or pericarditis.

Besides, the anatomical alterations of the myocardium vary considerably, both as to their etiology, nature, and seat. In regard to the latter it should not be overlooked that the lesions of no disease are universal in the tissues of a whole organ. A pneumonia is local, a nephritis need not change all of the renal substance, an encephalitis is local. So a myocarditis is not, or need not be, universal; it is mostly focal; indeed, parts of the myocardium may be healthy while others are diseased. That is why a drug that acts well on the healthy part of the muscle may not affect the abnormal portion, and *vice versa;* and why the results of our medication may leave—do leave—much to be desired.

The character of myocardial changes may be inflammatory or merely degenerative. Inflammation may be acute or chronic, gen-

eral or interstitial. The latter is mostly chronic, and frequently toxic. The degeneration of the muscular tissue of the heart may consist of mere parenchymatous turbidity or of granular degeneration, or may amount to segmentation and fragmentation,[1] which may have different causes, from very strong and irregular contractions to (more frequently) extensive acute or chronic, primary or secondary textural changes, with results depending on the extent of the lesion.

Of the greatest importance to the practitioner is the causation of myocardial anomalies, which are usually chronic. Congenital smallness of the heart may lead to lipomatosis without secondary dilatation; that is what I saw in a case of pernicious anæmia which proved fatal to a woman of thirty-four years. Insufficient nutrition with secondary anæmia injures mainly the muscular structure, more than the interstitial connective fibres. Chronic disturbances of the circulation, such as sclerosis of the coronary, universal atheromatosis, or chronic nephritis, disturb the nutrition of the heart by affecting its nutrient vessels. So does the obliteration of the pericardial cavity. Diseases of the respiratory organs, inflammatory or (as in whooping-cough) merely congestive, have a similar effect by interfering with general and local circulation. Lack of exercise, —for instance, in overtasked school-children and persons of sedentary habits,—though not so suddenly as over-exertion, injures nutrition. Chronic changes of nutrition,—*e.g.,* the scrofulous tendency,—and adiposity from whatever cause, have a similar effect. A certain number of myocardial alterations depend on nervous influences which either act directly on the cardiac innervation or influence the structure of the heart muscle by their effect on the cardiac circulation and nutrition.

The depressing effect of emotions causes distention, dilatation, or hypertrophy, by preventing the completion of systolic discharges, differently from what takes place during athletic sports. It is in these latter, particularly when the heart was not healthy previously, that temporary distention may become permanent. Indeed, fatigue alone renders the muscles more flaccid.

But many more structural changes of the myocardium are due to intoxications and infections. Alcohol, tobacco, syphilis, tuber-

[1] Hektoen, American Journal of the Medical Sciences, November, 1897.

culosis, and malaria have long been known in that connection. The dangers of the acute and chronic myocardial changes that follow infectious diseases have been studied these twenty years or less, since it became manifest that high temperatures alone were credited with more injurious consequences than they deserved. Typhoid fever, scarlatina, influenza, and diphtheria, particularly the latter, occupy the front rank as injurious influences. When their symptoms—principally arrhythmia and extensive (mostly systolic) murmurs, with (or without) accentuation of the second pulmonary sound—disappear within a few weeks, the prognosis as to complete recovery is good; it becomes doubtful when they remain a few months, and bad if after a year (good care being taken of the general health) the last symptoms are still persisting. The sudden deaths from heart-failure, mainly during and after diphtheria, find their ready explanation partly in the muscular alteration, partly in the structural changes in the innervating fibres of their ganglionic centres.

I mentioned arrhythmia of the heart as a prominent symptom. It has been attributed to a vast number of causes, to remember which taxes the memory unduly unless we class them under two heads, the first of which is abnormal innervation (neuroses and psychical diseases, cerebral affections, reflexes, poisoning with digitalis, coffee, tea, or alcohol), the second, a disease of the myocardium. All sorts of valvular affections have also been charged with having the same effect of causing arrhythmia, but we should not forget that the murmurs which are believed to be valvular are often myocardial, and that both stenoses and insufficiencies may depend on the condition of that small part of the myocardium in which the valves are inserted. Applications of ice, digitalis or strychnine internally, or in other cases an opiate, will frequently diminish or remove a murmur that was erroneously attributed to the lesion of a valve. Myocardial arrhythmia may be congenital; it is frequent in atheromatous and fatty degeneration, in acute or chronic inflammations, and in cases of pericardial adhesions. All the arrhythmias observed in typhoid, variola, and influenza should be explained by the parenchymatous changes brought about by the microbic or toxic infection. These parenchymatous and the acute and chronic inflammations of the heart muscle have a characteristic peculiarity, in this, that the lesions are not ubiquitous, or not equally disseminated. That is why the muscular contraction is not uniform, as, for in-

stance, in the cases of fibroma of the heart muscle observed by Ebstein. The results may be irregularity or gallop rhythm, while in those cases in which the change is uniform, as in many forms of fatty degeneration, the result is either tachycardia or bradycardia.

Heidenhain and Knoll found also that arrhythmia is observed when the heart is overcrowded with blood and its force not commensurate with the resistance met with in the peripheral circulation. It is particularly in these cases, as in some of the conditions enumerated above, that cardiac stimulants, such as digitalis and strychnine, seem to find their proper indications. In such cases we have to deal either with an incompetency of the whole myocardium or with a local weakness or fatigue depending on a local, perhaps not diagnosticable, alteration. Still, such instances are very perplexing, for it is exactly in them that the cardiac stimulants fail to act or become positively injurious.

Ethel Z., aged ten years, was admitted to the "Jacobi Ward" of Roosevelt Hospital, February 21, 1901. She had diphtheria several years ago; other history negative. Three weeks before admission the child had an attack of pain in several joints, with fever; she was in bed two weeks, has been out of bed since, but with dyspnœa and some articular pains. Urine 1026, trace of albumin, a few granular casts, no blood, no renal epithelia. Examination of the lungs, liver, and spleen negative. Apex beat in fifth space, outside of nipple-line, cardiac dulness corresponding and extending one centimetre beyond the sternum about the second right rib. Systolic mitral murmur quite loud. Second aortic and pulmonary sounds accentuated. Second (mitral and tricuspid) sound about the level of apex reduplicated,—gallop rhythm. She took some salicylate of sodium and February 26 was given one-fiftieth of a grain of strychnine three times a day.

February 28.—Urine negative, no casts. Gallop rhythm much more marked and radial pulse slightly irregular. Strychnine was discontinued and codeine, one-fourth of a grain four times a day, substituted.

March 4.—Systolic mitral murmur not changed, gallop rhythm less. It grew less from day to day till March 9, when codeine was omitted and replaced by strychnine.

March 10.—Gallop rhythm more marked. Its intensity grew

until March 15, when strychnine was discontinued and codeine resumed. After a week the second sound was no longer double, and the child, after having been out of bed, was discharged April 15.

Teresa de T., nine years old, was admitted March 7, 1901, with chorea minor. Had chorea five years previously and never was quite free. Three months ago the twitching became worse. Urine negative, with the exception of a few pus-cells. Lungs negative. Faint, soft systolic murmur at apex. Pulse very irregular and intermittent. Second sound over mitral and tricuspid duplicated,—gallop rhythm. Appetite poor, but patient sleeps well and feels comfortable when in bed. Liquor potassii arsenitis, and, on account of deficient appetite and also the gallop rhythm, which was attributed to myocardial debility, strychnine nitrate, one-fiftieth of a grain three times a day, were ordered.

March 10.—While continually in bed heart was more irregular, gallop rhythm more marked. Strychnine stopped and codeine, one-fourth of a grain four times a day, substituted.

March 14.—Pulse fairly regular, gallop rhythm much less.

March 18.—Pulse quite regular and gallop rhythm almost disappeared. Strychnine was resumed and codeine omitted.

March 20.—While the condition of the child was improved, the pulse became slightly irregular again and gallop rhythm returned. The experiment was discontinued, strychnine being omitted and codeine resumed. Gallop rhythm became less within three days and disappeared on March 31, when the patient was discharged.

In both these cases the temptation to regard the gallop rhythm as depending on general muscular weakness of the heart only was very great; if that diagnosis had been correct, strychnine would surely have been indicated. Failing utterly, it proved the incompleteness or the erroneousness of such diagnosis. Even if partly correct, the cases would prove the complex conditions of the cardiac lesions in many, perhaps most, instances. It would also prove that the modern maxim, "simplicity of prescription, only one drug at a time, no polypharmacy, rely on nature," has its unscientific and ridiculous side. Muscle, serous membrane, vagus, and sympathetic may be affected coincidently, or some of them at the same time. Rely on digitalis alone? Yes, if you be sure you want nothing but the stimulation of the pneumogastric. On strychnine alone? Very well, if you want a vasomotor stimulus. Alcohol? If you want to

dilate blood-vessels, in conditions of spastic anæmia, occasioned by fright, chill, or sepsis. Atropine? If you have to combat diminution in the number of cardiac contractions. Thus I might go on teaching the necessity of combining medicines in combined conditions.

Strychnine is eminently a vasomotor remedy which is indicated to correct defective distribution of the blood. It stimulates the centre of the pneumogastric nerve and thereby contracts all the blood-vessels under its control, mainly those of the heart and of the abdominal cavity. These latter depend on the action of the splanchnic nerve, section or paralysis of which results in dilatation of the numberless and dilatable vessels of all the viscera. The vast amount of blood thus stored in the abdominal cavity is withdrawn from the aorta, the pressure of which is lowered (even much more than in excessive aortic insufficiency), and from the brain. Pallor, collapse, and syncope are the results.

Strychnine, through its stimulating influence on the centre of the vagus, contracts the paralytic blood-vessels, and thus facilitates a new supply to the heart and brain.

The dose of a remedy required is by no means a stable one, for the amount of blood appears to influence the action of a drug in the living organism. Welker explains the resistance of fish to the action of curare by their smaller amount of blood, which has from one-fifty-third to one-ninety-third of their body weight, while the proportion in the dog is from one-twelfth to one-eighteenth, and in man from one-thirteenth to one-nineteenth, the latter being the ratio in the young, the former in the adult. It appears, therefore, that in fish the poison arrives at the periphery of the nerves more slowly than in the mammal. In accordance with this observation is that of Delaunay,[1] who found that when a frog was poisoned by strychnine after a depletion, its action was less marked than in a frog not so depleted. Of two frogs that one which was better nourished was more sensitive to the action of a poison than that which was emaciated by starving, and the right half of the body, which in frogs is more developed than the left, was more sensitive—more readily poisoned—than the latter. It would consequently appear that, like young infants, ill fed, emaciated, slowly convalescent, or septic

[1] Comptes-Rendus de l'Acad. des Sciences, vol. xliii. p. 452.

patients, or those in whom the nerves—for instance, in infectious fevers—have undergone organic deterioration, require larger doses of strychnine (also of other poisons, such as quinine, atropine, and nicotine) than the normal organism.

The new-born infant is but little sensitive to strychnine. The spastic effect is obtained by 0.415 of a milligramme of the nitrate in a kilogramme of the newly born animal, 0.347 milligramme is effective when two and a half days old, 0.218 milligramme when seven and a half days old, and 0.210 milligramme when ten days old.[1] This observation is fully in accordance with the fact (Soltmann) that reflex effects are but scantily obtained in the newly born animal.

Still, in older children unexpected effects of strychnine have been observed; accidents after its subcutaneous use in diphtheritic paralysis have been recorded. Hyperæmia of and hemorrhage into the nervous centres, mainly the brain, seem to cause a great sensibility towards strychnine. I should judge that it is due to the diminished or paralyzed inhibition, in the same way that patellar reflexes are exaggerated during cerebral diseases.

Some of the fatal terminations of strychnine treatment occurred in cardiac diseases; it is worth while to take notice of such facts as long as the prevalent habit of prescribing strychnine is apt to run into the thoughtlessness of routine.

Strychnine is claimed as a vasomotor stimulant. The centre of vasomotor influences is located near the inhibitory and also near the respiratory centres. The vasomotor centre regulates blood-pressure and influences the contractions of the heart. They become more frequent during an increase and more slow during a diminution of blood-pressure. It appears evident that whatever drug influences blood-pressure influences the heart. Blood-pressure, however, depends not on the heart alone, but also to a great extent on the peripheral circulation, which is almost wholly due to the action of voluntary and involuntary muscles. Their tone is influenced by their voluntary or involuntary action. Contractions of the voluntary muscles, brought about or strengthened by strychnine, for instance, or by massage or electricity, increase general blood-pressure by inciting

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[1] L. Lewin, Die Nebenwirkungen d. Arzn., third edition, 1899, p. 6; F. A. Falck, Arch. f. d. ges. Phys., 1884, p. 525.

arterial action and the force and number of the contractions of the heart. It is, indeed, in conditions of inactivity or insufficiency of the voluntary muscular system, no matter of what origin, with its incompetent effect on the general circulation, that strychnine finds one of its principal indications. That is why it is not indicated in vascular neuroses, attended, as they frequently are, with increased tendency to reflex action, no matter whether they are uncomplicated, form a part of general hysteria or neurasthenia, or are connected with organic nervous disorders. Some of these neuroses are dependent on or complicated with local endocarditis or with general arteriosclerosis. In many the fundamental, in others the organic symptoms are predominant. To that general class belong the paroxysmal pulsation and dilatation of blood-vessels, mainly the aorta, the paroxysmal congestion of the face, the acute circumscribed œdema, the intermittent dropsy of the joints, Raynaud's disease, Weir Mitchell's erythromelalgia, Schultze's akroparæsthesia, and the intermittent limping called Erb's angiosclerotic, intermittent dysbasia.

A DESCRIPTION OF THE METHODS OF INVESTIGATING THE ACTION OF DRUGS.

BY HORATIO C. WOOD, JR., M.D.,

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PART I.

THE large number of drugs which have been introduced to the profession with most fulsome recommendations and the rapidity with which they have fallen into oblivion afford conclusive evidence, if any further was needed, of the untrustworthiness of the empirical method of study as a means of advancing our therapeutic knowledge. Of the substances recently introduced by drug manufacturers it is noteworthy that nearly all of them which have achieved a place promising any degree of permanence in our list of practical remedies have been those whose introduction has been through the legitimate channel of the pharmacological laboratory. The profession is slowly learning that other claims for recognition are based on inaccurate observations and commercial presumption. Bedside observation of the value of new drugs fails for a number of reasons, the most important of which is the well-known psychological fact that the human mind usually sees what it is looking for, whether the reality is there or not. Gradually the American profession is coming to realize this truth, until to-day a recommendation from a German clinic is looked upon almost as a certificate of worthlessness.

Nevertheless, the profession at large still reads clinical papers on the effects of a drug with more interest than is felt in scientific demonstrations of its actual value; indeed the latter, however useful and instructive they may be, are frequently not read at all. The reason of this neglect of one of the most important branches of medical literature lies in the fact that oftentimes these scientific disquisitions are but dimly comprehended. At the time when the greater proportion of the physicians of to-day were students of medicine, pharmacology had not achieved the important place in our medical curriculum that it now occupies, and consequently a

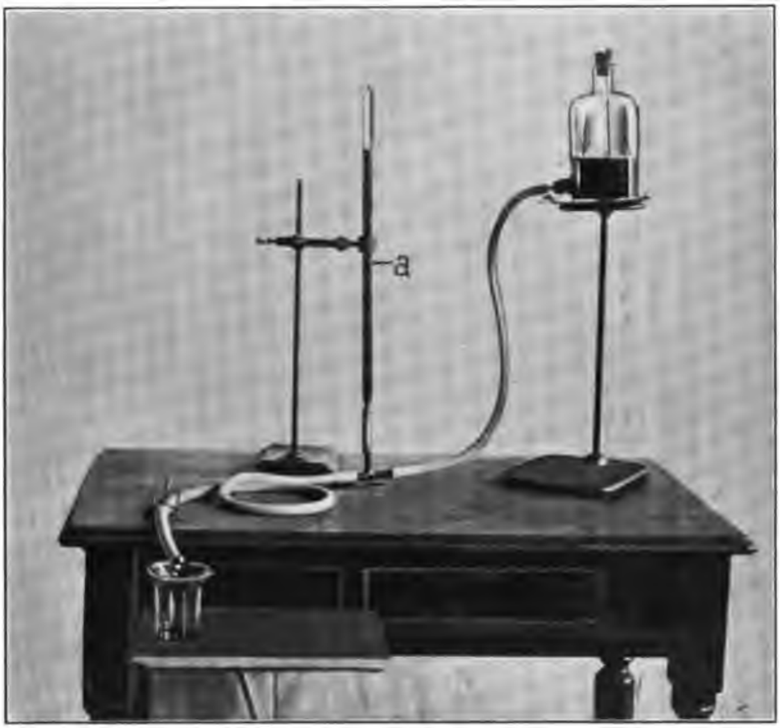

Fig. 1.—Mariotte's experiment.

large number of practitioners know little concerning the means used in investigating drugs. An account, therefore, of the modern methods employed in studying their effects may prove of value by enabling the reader to interpret for himself the bearing of results from the pharmacological laboratory.

We can best treat such a large subject by specializing, and I shall therefore take up each system separately and give an account of the more important methods of studying changes brought about in the various organs by drug influences.

CIRCULATION.

The vitality of the various parts of the body and the performance of their functions by the various organs are absolutely dependent on the maintenance of a certain degree of pressure within the arterial system; it is impossible for the blood to penetrate into the innumerable small capillaries unless there is considerable force behind it. The pressure of any fluid within a tube depends upon two factors, the driving force—the *vis a tergo*—and the resistance offered by the tube itself,—the *vis a fronte.* This fundamental fact of physics is so well known that it may seem superfluous to more than merely mention it, and yet it is so absolutely essential to bear clearly in mind always both the mechanical and the physiological principles involved, in order properly to interpret the changes which take place under the influence of various poisons, that at the risk of becoming tedious I shall briefly recall a few of the important points in the physiology of the circulation.

The fact mentioned above, that the pressure in the blood-vessels bears a relation to both the pumping force and the resistance offered, may be proved by the following experiment of Mariotte. (Fig. 1.)

In the illustration the bottle, which is so arranged as to give a constant pressure, represents the pumping force. At the end of the tube, by means of the screw clamp, we can narrow its lumen and thereby increase the resistance. When this tube is completely closed, the pressure in the upright gauge will, of course, be the same as that within the bottle. If we were to open the clamp halfway we would find that the pressure in the column would fall, for example, to the point marked *a,* while if it was fully opened the pressure would fall almost to zero. On the other hand, if we should elevate the bottle, thereby increasing the driving force from behind,

we might to a certain extent overcome the lowering action of diminished peripheral resistance. If the resistance is constant, the pressure in the tube, of course, will fall or rise according as we lower or elevate the bottle.

This simple problem, when applied to the circulation of the blood, is complicated by the fact that the pumping force, represented in the heart, is an intermittent one. It is evident that with a rhythmically acting pump, such as the heart, the total work done may be altered by changes either in the frequency of its beats or in the force of each single contraction. Both the heart and the blood-vessels are under the control of the nervous system, and drugs may, therefore, affect these organs either by a direct action upon their muscular coat or by affecting the nerve-centres governing them. The following schema I have found useful to keep in regular order in the mind the manner in which drugs may lower or raise the blood-pressure.

CHANGES ELEVATING BLOOD-PRESSURE.

- On Behalf of the Heart
  - Increase in force, due to direct action on cardiac muscle.
  - Increase of rate, due to
    - inhibitory paralysis
      - central,
      - peripheral.
    - accelerator stimulation.
- On Behalf of the Vessels
  - Constriction due to
    - stimulation of vasomotor centres.
    - stimulation of muscular walls of arteries.

CHANGES LOWERING BLOOD-PRESSURE.

- On Behalf of the Heart
  - Lessened force—direct action on muscle.
  - Lessened rate—inhibitory stimulation
    - central,
    - peripheral.
- On Behalf of the Vessels
  - Dilatation
    - Paralysis of vasomotor centres.
    - Paralysis of blood-vessel walls.

Besides in these direct ways, drugs may also affect the blood-pressure indirectly. For example, those drugs which primarily affect the respiratory centres usually cause an elevation of the pressure due to an accumulation of carbonic acid in the system.

In the above schema it will be noticed that under the influences mentioned as elevating the blood-pressure is increased rate of the heart, due to inhibitory paralysis. This applies to the majority, but not to all, of the mammals. In these animals the pneumo-

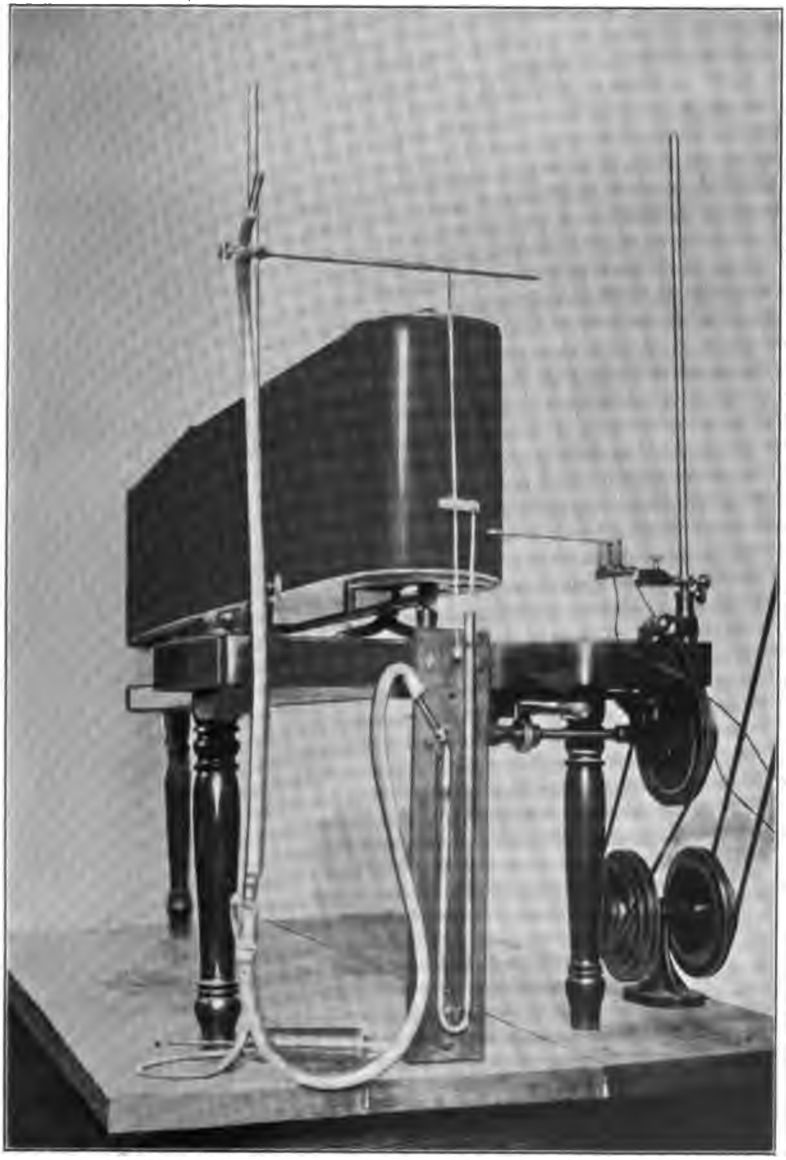

Fig. 2.—Manometer and Reichert kymograph.

gastric centre is in a state of constant activity, so that the heart is continually being restrained; and those drugs which paralyze cardiac inhibition allow the heart to beat more rapidly, at what we may call its muscular rhythm. Among those animals whose inhibitory apparatus is in a state of tonic activity may be mentioned man and the dog; as a rule, the rabbit's heart is not so restrained. Since the accelerators are not ordinarily active, accelerator paralysis produces no slowing of the heart.

The first necessity in studying the influence of drugs upon the blood-pressure is an apparatus to measure the intravascular pressure. Various forms of apparatus have been devised to study the changes in the pressure without operation, so that they may be applicable to human as well as to animal studies. These operate on the principle that a pressure applied to the outside of an artery approximately equal to the pressure within the artery will occlude its lumen. Such methods are fallacious because of the resistance to compression offered by the overlying structures as well as the natural resilience of the arteries themselves; and, although the sphygmomanometer (as such an apparatus is called) may have a certain value as confirming for man the results obtained on the lower animals, in accurate studies of drugs we must open the arteries and directly estimate the pressure within. As the pressure in any series of tubes connected with the same pumping force is practically the same throughout the whole series, it matters but little what artery we choose in which to measure it. As a matter of convenience, usually either the carotid or the femoral artery is chosen, because they are both comparatively large arteries and lie in an easily accessible position. For the actual estimation of the pressure in these arteries we avail ourselves of the mercurial manometer. This apparatus (Fig. 2) consists of a U-shaped tube, partly filled with mercury; one limb of the tube is connected with the artery chosen, that being filled with fluid. The necessity of having the whole tube from the artery to the mercury filled with liquid is due to the elasticity of the air, whose compressibility is so great that a not very large bubble of it may almost entirely obliterate the pulse-waves. In the other limb of the manometer there floats upon the mercury a fine needle, which is used to record the excursions of the mercurial column upon a moving surface. Before the epoch-making invention of Ludwig of the so-called "graphic" method of

studying the blood-pressure, experimenters placed behind the tube a graduated scale, and were forced to note from time to time the changes in the height of the column as they occurred. In the graphic method the absolute height of the blood-pressure can be obtained simply by measuring on the tracing of the line of the pressure from a known base line. By measuring the height at various places the results of the experiment can be conveniently recorded in tabular form.

In preparing the carotid artery to study the intravascular pressure an incision is usually made not directly over the artery, but in the median line of the neck. This opening has the advantage that through it we can reach not only the artery that we wish to connect with our manometer, but also the trachea and the pneumogastric nerve on the other side. In studying those drugs which act upon inhibition it is necessary to have control of both pneumogastric nerves, since sufficient impulses may be sent down one of these nerves to overcome the effects of destruction of its fellow. After ligating the upper end of the carotid to prevent back hemorrhage from collateral circulation, a small arterial clip is placed on the artery below and a V-shaped opening made with a pair of scissors. Through the opening is inserted a glass cannula, somewhat bulbous on the end to prevent it from slipping out of the artery. This cannula, as well as the piece of vessel between it and the arterial clip, is filled with some anticoagulant fluid, because the moment pure blood touches the glass a clot will form at the narrow opening and prevent any record. For the purpose of preventing this coagulation we may use a saturated solution of either magnesium sulphate or sodium bicarbonate. The latter, although not such a powerful anticoagulant as the magnesium salt, has the great advantage that it is not poisonous, and if by chance the blood-pressure should fall so low that a few drops enter the general circulation no harm is done. The large syringe which connects with the tube at the right-angle piece in Fig. 2 is for the purpose of equalizing the pressure in the mercurial column with that in the artery. If the pressure in the mercurial column were at zero when we opened the arterial clip, the pressure of the blood coming from the heart would force the soda solution out of the cannula, and a clot would very shortly be formed.

The variations of the mercurial column are recorded on a

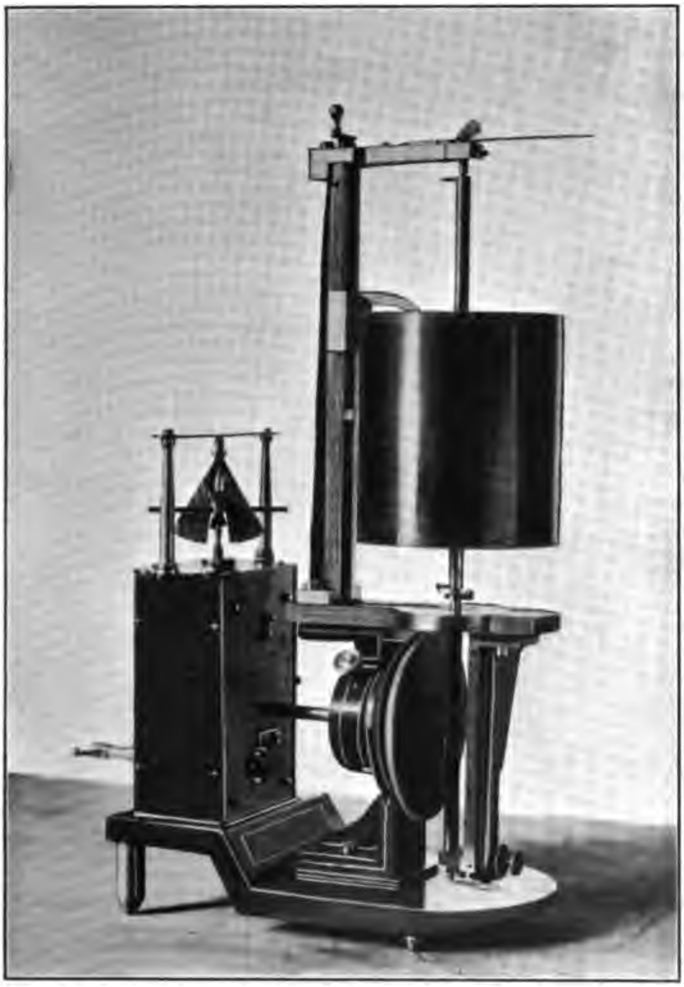

Fig. 3.—Ludwig's kymograph.

FIG. 4.—Showing method of lamp-blacking paper.

revolving drum known as a kymograph, several forms of which are in use. The simple Ludwig kymograph (Fig. 3), having but a single drum, is too small for long experiments; hence various modifications have been made on the principle first brought forth by Hering, of which Fig. 2 is a sample. In both of these forms the records are made by a needle scratching a lampblacked surface; after the experiment the tracings are varnished with shellac for preservation. In the "endless paper" kymographs a large roll of paper is drawn across a revolving drum and rolled up on the other side. The tracing is made on the moving paper by a capillary glass tube filled with ink. This apparatus permits of recording experiments of almost indefinite length without any difficulty; it has, however, the great disadvantage that constant attention must be paid to see that the point is well filled with ink and the capillary opening is free from obstruction.

The generally more convenient method, and the one which I practically always employ, is that with the long roll of smoked paper. The apparatus in Fig. 2 is driven by steam power, the belt being connected with a shaft which runs the whole length of the laboratory. Similar forms of apparatus are driven by steel springs, by electric motor, or by the force of gravity. The paper used has on one side a highly glazed surface, which, being perfectly smooth, leaves a clear white mark.

The method of smoking this drum is demonstrated in Fig. 4. The lamp should be turned up rather high, so that a large amount of soot will be deposited; the drum is moved slowly but steadily, to prevent scorching of the paper and yet give the lampblack time to adhere to the surface. The central arrangement is for the purpose of tightening the paper on the drum.

Having prepared for our experiment, let us take, as the means of bringing out more clearly the principle involved, a study of the active effects of one or two of the most important of the circulatory drugs.

Suppose we inject into the vein of a dog a dose of tincture of digitalis. The first effect of this drug will be a distinct slowing of the pulse, followed shortly by a considerable rise of pressure. If the dose has been large enough to be toxic, the pulse after a time suddenly becomes exceedingly rapid, this rapidity continuing until the heart stops beating and the blood-pressure falls to zero. (Fig. 5.)

To the therapeutist the most important changes are those caused by a physiological dose of the drug,—namely, the slowing of the pulse and the elevation of the blood-pressure. Referring to our schema, we note that slowing of the pulse is brought about by stimulation of some portion of the cardiac inhibitory apparatus, either the centres in the medulla or the peripheral termination of the vagus nerve in the heart. If we divide the pneumogastric nerves, we separate the heart from the inhibitory centres, and no amount of stimulation of those centres can have any influence upon the rate of the heart. Should we make this section at a time when the pulse is slowed by digitalis, we will find that there is an increase in the rate of the heart, but that despite this increase it is still beating more slowly than in the normal animal. The partial quickening of the heart which results from section of the vagus indicates that a portion of the action of the drug upon the cardio-inhibitory has been central. Since, however, the heart does not beat as frequently as at the beginning of the experiment, whereas in the unpoisoned animal section of the pneumogastric gives a great increase in the rate, it is evident that this drug exercises an influence which slows the heart even after section of the pneumogastric, and must therefore have some action upon the peripheral cardiac inhibitory apparatus. Direct proof of this fact is not wanting; we have certain drugs, notably atropine, which paralyze completely the intracardiac ends of the vagus, so that electrical stimulation of this nerve is incapable of affecting the pulse-rate. If we give digitalis to a dog which has received atropine (Fig. 6), we find that the drug fails to slow the pulse in the characteristic manner, showing that the slow pulse is due to inhibitory stimulation. The important practical bearing of this observation lies in the fact that stimulation of the inhibitory apparatus slows the heart by prolonging the diastole, and that it is during the diastolic period that the reconstructive processes take place in that organ, which is one of the explanations of the value of digitalis in diseased conditions of the cardiac musculature.

If, on the other hand, the drug which we are investigating gives a rapid pulse,—as, for example, atropine,—we wish to find out whether the increased rate is due to accelerator stimulation or to inhibitory paralysis. To determine this we divide the two vagi, which by removing the restraining impulses allows the heart to beat in its muscular rhythm. If after pneumogastric section, the drug causes

no further increase in the pulse-rate, it shows that the drug does not affect the accelerators. We now apply an electrical current to the peripheral end of one pneumogastric, and, if the electrical stimulation is unable to slow the pulse, we know that the vagal palsy is peripheral. If, on the other hand, the poison has acted, like nitroglycerin, solely on the inhibitory centres, we will find that the electric current applied to the pneumogastric nerve retards the heart precisely as in the normal animal.

The elevation of the pressure from digitalis may be considerable, even in the normal animal, but it is greatly lessened by the extreme slowing of the pulse which occurs. If we prevent this slowing of the pulse by paralysis of the pneumogastric, the pressure will rise even more than in the normal animal.

When we come to determine the ways in which drugs elevate blood-pressure, so many complicating factors are met with that we attempt to simplify the problem as much as possible by paralyzing the inhibitory mechanism, thus destroying any possibility of change in the rate of the heart through nervous influences. A slow pulse is nearly always a large pulse, even if there is no increase in the power of the cardiac muscle. When the diastolic period is prolonged more blood is allowed to enter the ventricle, and consequently, although the contraction of the ventricle may not be any more forcible, a larger amount of blood is thrown out, producing a large pulse. The size of the pulse-waves following the administration of digitalis, as in Figs. 5 and 7, does not, therefore, necessarily indicate any increase in the power of the heart muscle. If, however, we have paralyzed the inhibitory apparatus, so that the rate of the heart is not affected by digitalis, we usually find a still perceptible increase in the size of the pulse-waves. In a general way this may be taken to indicate an increase in the power of the heart, yet we cannot allow ourselves to draw positive conclusions from such insufficient evidence.

For the purpose of investigating more closely the effect of drugs upon the heart itself we study the behavior of this organ when separated from the body. For this purpose we usually employ the heart of the frog. This convenient little organ will go on contracting regularly under the most adverse circumstances, and, if separated from the body and provided from time to time with a little nutriment, it will act as regularly and respond as accurately to drugs as if it were

in its normal position. For the purpose of studying the frog's heart several methods have been devised; the simplest of these consists in exposing the heart, dropping our drug directly upon the muscle, and noting, either with the eye or by means of a light lever laid across the ventricular portion, the changes in rate and force of the organ. This method is so easily performed and the apparatus required so simple that it can be used by almost any one, and gives considerable information concerning the action of drugs. It has, however, two objections,—one, that a certain amount of the drug may be absorbed, in which case the substance will affect the nervous centres as well as the heart muscle; the other, that drugs administered in this manner affect the heart much less than when brought into its interior chambers, owing probably to the fact that when they are introduced into the ventricle they are forced out through the coronary arteries and equally distributed through the whole cardiac muscle.

It, therefore, becomes important to isolate the heart entirely from the body and study the changes which take place after the introduction of certain drugs into the ventricle. For this purpose we must have an apparatus which permits of a free circulation of the blood in and out of the heart and allows us to supply either poisoned blood or a normal nutrient fluid. There are two forms of such apparatus in common use,—that devised by Dr. Williams and that of Professor Kronecker.

Fig. 8 represents the frog-heart apparatus of Professor Kronecker. The two upright tubes are filled, one with a dilute solution of ox-blood, the other with blood to which has been added a small proportion of the drug to be studied. By means of the stopcock we can allow the fluid to pass from either one of these tubes at will, so that we may furnish the heart either with normal blood or with poisoned blood, as we desire. A free circulation of the fluid through the heart is provided by the peculiar form of cannula used, known as the perfusion cannula (see Fig. 9). The blood which is forced out of the heart by its contractions is driven against a small mercurial column, upon which floats a very light needle, whose movements are recorded upon a Ludwig kymograph.

If the drug added to the blood is a cardiac stimulant the contractions of the heart being more vigorous force more fluid against the mercury, causing a like increase of the excursions of the needle.

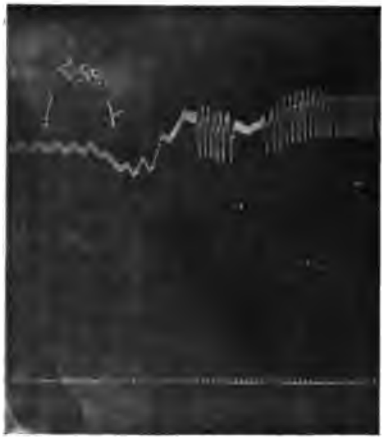

Fig. 5.—Photograph of a tracing showing the first action of digitalis,—elevation of pressure and slowing of pulse. The upper line is the blood-pressure; the lower line is the base-line and second marks.

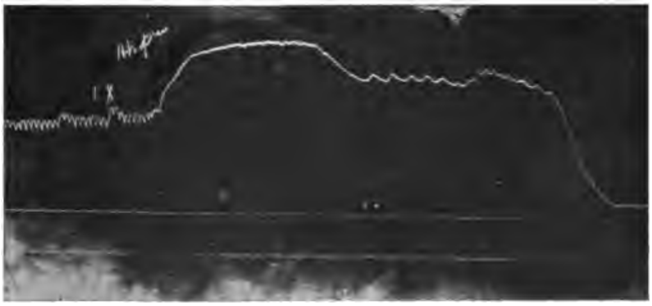

Fig. 6.—Photograph of tracing showing the action of atropine in the slow pulse of digitalis poisoning. Note, also, the final sudden arrest of the heart which is typical of digitalis poisoning.

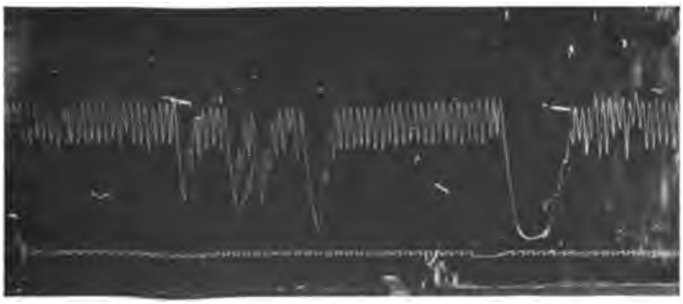

Fig. 7.—Photograph of tracing showing the slow pulse, with long diastolic pauses of digitalis.

(Figs. 5, 6, and 7 are reduced one-half, and are untouched by an artist so as to show exactly how the tracings look when they come off of the drum.)

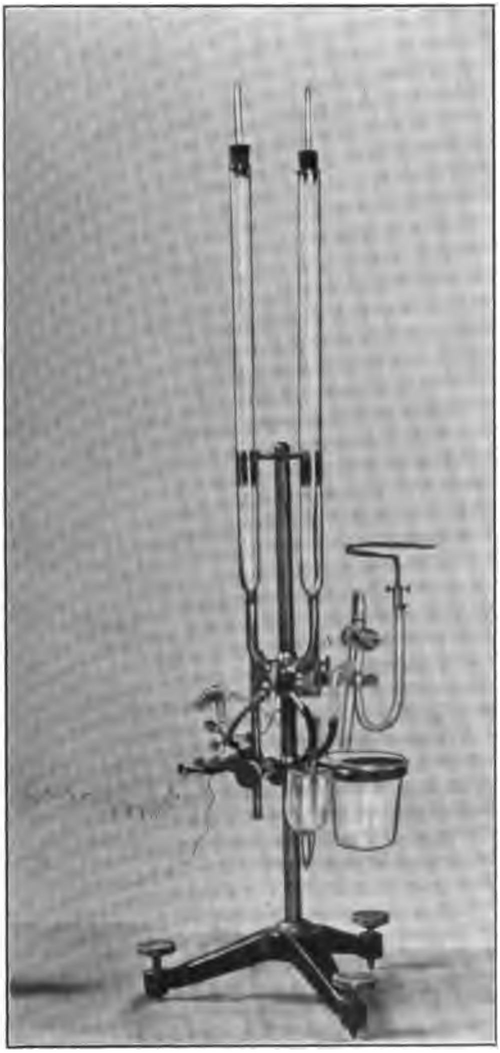

FIG. 8.—Kronecker's frog-heart apparatus.

On the other hand, under a heart depressant, we find that the systole grows progressively smaller and the diastole more complete until the heart remains permanently relaxed.

Fig. 9.

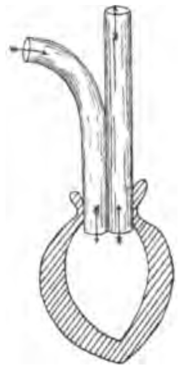

Diagram of perfusion cannula for frog's heart (much enlarged). The arrows show the direction of the nutrient fluid.

Studies are sometimes made upon the heart of a warm-blooded animal in order to determine any difference in the susceptibility between the batrachian and the mammalian heart, but the methods employed therein are too complicated to be described in this article.

The rise of the blood-pressure under digitalis we have shown to be due, at least in part, to an increase in the cardiac force. We have not, however, excluded the possibility of a second factor—namely, contraction of the blood-vessels—sharing in this elevation. The means of studying the changes in the size of the vessels are less satisfactory than those which are applicable to the heart. The number and variety of methods employed prove that none of them is perfect.

The simplest way of studying the changes in the calibre of the arteries is by direct observation. For this purpose we may lay upon the stage of the microscope either the mesentery or the web of the foot of a frog, and observe directly the alterations in the size of the vessel; or we may note with the naked eye changes in the artery in the ear of a rabbit. The simplicity of these methods is their chief recommendation, for they are not very reliable. As we have no suitable means of accurately measuring the diameter of the capillaries, the alterations brought about in them through drug influences can only be approximately estimated. The apparent amount of these changes will, therefore, depend on the accuracy of the observer's eye and the exactness of his memory. That strange fatality which has been mentioned above as interfering with the value of clinical observation forces the investigator, however he may strive against it, to see what he expects, so that among equally competent observers one may see the vessels become widely dilated while another perceives them narrowly contracted as the result of the

influence of the same drug. Again, extraneous influences, such as the drying of the parts or a draught of cold air, exercise such a marked effect on the capillaries as to render the method of really little value to pharmacology.

More useful are those methods which are based upon the principle that the wider the vessel the greater the amount of blood which will pass through it in a given time, provided the pumping force remains constant. The simplest way of estimating the rapidity of the blood-current is by amputating two or three toes of the frog and counting the number of drops which fall from the bleeding point in a given time, observing whether the hemorrhage is lessened or increased by the drug. The two objections to this method are the liability of the formation of a partial clot within the vessel and, more important, the alterations which may take place in the heart. If the heart is weakened, it is evident that the blood will flow less rapidly, even though the vessels may not be affected, and we might therefore conclude that a cardiac depressant was a vasomotor stimulant.

A more accurate method, based on the same principle, is that of the Ludwig *Stromuhr.* This consists essentially of a double-sided vessel revolving on a pivot, so arranged that either side can be applied to the artery. One-half of the vessel is filled with olive oil and sufficient blood is allowed to flow in to force the oil into the other side. The apparatus is then turned so that the oil is again against the arterial current, which forces the oil into the other side and the blood out of it into the vein. By observing the time which the artery requires completely to fill half of this vessel, we can calculate the amount of blood which flows through the artery in a given time. If the heart's force remains constant, any contraction of the vessel will, of course, diminish the rapidity with which the blood passes through it. Since, however, the cardiac impulse usually varies, the method by itself gives no positive information concerning the state of the vessels; but, when studied in conjunction with the blood-pressure curve, it has a considerable value. Suppose, for example, a certain drug elevated the blood-pressure but lessened the rate of flow; this would indicate positively that the elevation was due to contraction of the vessels, for, if the rise of pressure had been due to greater heart action, the increase in the cardiac force would have driven the blood through the vessels more rapidly. Conversely, if

FIG. 10.—Rabbit's foreleg in plethysmograph. The rubber collar near the foreshoulder fits the part accurately to prevent leakage.

FIG. 11.—Taking blood-pressures simultaneously in carotid and pulmonary arteries. *a* is the tube supplying air artificially, as respiration is impossible.

we found that the elevation of pressure was accompanied by a rise in the rate of flow, we would know that the increase of pressure was due in great part to an increase in the work of the heart.

The third commonly employed means of studying the calibre of the vessels is the plethysmographic method. This is based on the fact that dilated vessels containing more blood take up more room, and any widening of the vessels, therefore, increases the size of the part.

In Fig. 10 is represented a plethysmograph fitted to the leg of a rabbit. The plethysmograph itself (*a*) and the whole series of tubes to the recording tambour (*b*) are carefully filled with fluid, since the movements are so small that the elasticity of the air would almost entirely absorb them. By lengthening the recording lever (*c*) we can magnify these movements to any reasonable amount. If, under these circumstances, we give a vasodilator to the animal, we find that the extremity becoming larger forces the fluid out of the plethysmograph into the elastic capsule of the tambour and moves the needle upward. With such an arrangement we get the record of the pulse-waves, because, of course, after each contraction of the heart there is a greater amount of blood in the part.

This method is applicable to several organs,—for example, the kidney, when the apparatus employed is known as the oncometer,—and, although the form is then, of course, somewhat different, the principle remains the same. But the vessels which dominate the blood-pressure are those of the abdominal cavity, and the method has not as yet been successfully applied to them. (Fig. 11.)

The most valuable means of determining the state of the vessels is, after all, by critical study of the blood-pressure. If, for example, we have found that a drug has increased the pressure within the arteries and we wish to determine whether this increase has been due to the heart or to vasomotor action, the first requisite is to divide the spinal cord. It will be remembered that the vasomotor centres are located in the medulla oblongata, and that the nerves from these centres pass down at first through the spinal column, leaving this at different levels according to the areas which they supply. A complete section of the cord immediately below the medulla, therefore, prevents all vasomotor impulses passing downward.

If we find that the drug which caused a rise of the blood-pressure in the normal animal is incapable of doing so when the cord is divided, we know that the action of the drug has been chiefly upon the vasomotor centres in the medulla. On the other hand, if we find that the elevation of the pressure is not prevented by division of the spine, we know that the drug has elevated the pressure either by stimulation of the heart or by a direct action upon the muscular coats of the arterial walls. To separate these two actions is very difficult; attempts have been made to paralyze the vessel-walls by full doses of chloral and note whether the poison is still capable of affecting the arterial pressure. The objection to this method is that chloral is not only a paralyzant to the vessel-wall but a powerful depressant to the heart as well, and the latter organ may easily be so weakened by it as not to respond in a normal manner to the cardiac stimulant. We must, therefore, refer back to our studies upon the isolated frog's heart.

(To be continued.)

RESULTS OF A MISTAKE IN PUTTING UP A PRESCRIPTION FOR ADRENALIN CHLORIDE TO BE USED AS A NASAL SPRAY.

BY CHARLES H. BURNETT, M.D.,

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In June and July last I had under treatment for ambilateral chronic catarrhal otitis media, with tinnitus and deafness, both of high degree, Miss K., of South Carolina, a school teacher, thirty years old. In September she wrote to me that she had symptoms of hay fever, and I sent her a prescription for a solution of adrenalin chloride (P. D. & Co.) 1 to 10,000 in water. In order to make my prescription clearly understood, I wrote it in English as above. It was sent by the patient to be put up by a " reliable druggist" in the nearest city, forty miles from the village where she lived. I had ordered her to spray her nose moderately—that is, with about three puffs (two cubic centimetres) from the atomizer to each nostril—with this mixture three times daily. Unfortunately, the druggist sent her the undiluted solution of adrenalin chloride (1 to 1000, P. D. & Co.), in the original bottle, with printed label upon it. What happened is told in her own words as follows:

"September 21, 1901.

" The spray came yesterday,—Friday. I used it after dinner, at bedtime, and again this morning. It gives me such strange sensations that I think it best to write you at once. I can hardly describe the sensations, they are so peculiar. My head feels full, and there is a dull, heavy pain in my forehead. The throat at front and sides throbs and aches much more than usual, and the roaring in my ears increases. It makes me feel so badly that for a time I have to lie down. My hands, back, and even my knees begin to tremble, and I feel as if under a nervous excitement. In about an hour these feelings all pass away and I feel about as usual. For several minutes after using the spray a quantity of watery mucus is

discharged through the nose, or back into the throat if I am reclining. I feel just as I do when in the first stages of a severe cold in the head. The spray makes the back part of my nose burn and smart considerably, but not too severe to be borne, although for a time it hurts so badly the tears stream from my eyes. It is now two hours since I used the spray this morning, and I still feel its effects. My ears are roaring and the back of my nose feels a little sore still. I will go on using this spray for a week and will write you on Friday,—that is, a week hence. In the mean time, if these symptoms are not what you expected and you wish me to discontinue the spray, I know you will write me at once. For quite a time after using the spray the muscles or glands at the sides of my throat feel drawn and tense whenever the head is turned far in an opposite direction, and I am sure there is some swelling under each ear. When I talk the roaring sound in my ears increases greatly."

She inclosed a copy of the printed label found upon the bottle of the adrenalin chloride. I immediately wrote to her that there had been a mistake in the prescription and that she must use it no longer.

Writing again on September 22 the patient continues: "I have used the spray twice since I wrote you yesterday, and each time its effect has been so very strange that I have decided to discontinue it until I hear from you. Last night after using the spray it was the longest time before I could become quiet enough to sleep. I trembled all over and my heart beat so loudly and fast that I was frightened. I do not think I swallowed a drop, and I cannot understand how the medicine can affect me so. Nothing I have ever used has ever made me feel so badly, and it worries me. The bottle was open when it came to me. The spray is of a light pinkish color, and I have to press the bulb slowly and wait a minute or two before I can use another because it seems to strangle me."

Under the date of September 30 her sister, also a patient of mine, wrote as follows: "I am sorry to write you that my sister has had a very serious accident to her throat. She wrote you about a week ago that the last new medicine had a bad effect, but before she received your reply to stop using it she had sprayed her nose at least five times. By the time she got your letter she was suffering a great deal, and has been really ill since Friday, the 27th of September. Every part of her head [meaning the nares and naso-

pharynx] and throat is scalded. She has lost entirely her sense of taste and smell and can hear only a little. The illness came on like a severe attack of croup, with sore throat and extreme hoarseness. She lost her voice entirely for two days. Since then there has been a constant stream of mucus from the nose and into the throat and she coughs up great mouthfuls of phlegm. The roaring and ringing in her ears have greatly increased. When she stopped the adrenalin chloride, she used the oily spray you gave her, one day [terebene ten minims in fluid albolene one fluidounce], thinking it would soothe her nose and throat, but it seemed to increase the irritation."

Under date of October 4 the patient, having recovered sufficiently to write to me, stated, regarding her symptoms before the final laryngeal attack which laid her up, as follows: "The entire head felt burning, but my hands, feet, and body were cold. No one suspected fever and my temperature was not taken. I became ill on Wednesday. On the following Saturday I was suddenly attacked with nausea, and in one minute I was rigid; lower jaw, arms from elbow down, stomach, and calf of legs seemed dead. I could not have bent a finger to save my life. They gave me up. All thought I was dying. I thought so too. I was perfectly conscious. Fortunately, our physician was in the village, and he came to see me in about half an hour. After an injection of strychnine I rallied, and by afternoon with the exception of the soreness in my limbs I felt all right, excepting, of course, my head. My sense of taste and smell have come back in a measure, but not my hearing. That is worse than it ever was."

The only treatment that I advised my patient to apply to her inflamed respiratory tract consisted in breathing, through the mouth and nose inserted into a wide funnel, the vapor of very hot water, repeated as often as seemed necessary; this gave her some relief from her great discomfort. Under date of November 2, 1901, she writes that since the acute symptoms have passed off, her deafness and tinnitus are worse than ever.

A solution of adrenalin chloride in the strength of 1 to 10,000 is, according to my experience, the safest and most efficient drug at our command in the treatment of any form of acute rhinitis, and that the unfortunate effect of its misuse in too strong a solution in this case is due entirely to the carelessness of a druggist;

it demonstrates, however, the great potency of this most valuable preparation.

It has been shown[1] that a 1 to 1000 solution of adrenalin chloride will blanch the conjunctiva at the risk of serious engorgement of the deeper anastomosing blood-supply of the iris and ciliary body, if these blood-vessels be in an abnormal condition. It seems that in my patient the accidental use of such a solution led to a profound congestion of the blood-vessels of the nares, the nasopharynx, and probably of the pharynx and larynx, none of which were entirely normal at the time of the accident. I have never seen anything but a good result from using adrenalin chloride in solutions varying from 1 to 10,000 to 1 to 5000 in strength, in various diseased conditions of the nares, nasopharynx, and pharynx.

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[1] H. B. Lemere, American Medicine, October 5, 1901.

ON THE SUPERIORITY OF SMALL, REPEATED DOSES OF SOLUTIONS OF MERCURIAL SALTS IN TREATING SYPHILIS.

BY L. BROCQ, M.D.,

Physician to Broca-Pascal Hospital, Paris.

The treatment of syphilis has undergone very considerable modifications during the last few years. Subcutaneous and particularly intramuscular injections of mercurial compounds, both soluble and insoluble, have finally been completely adopted in ordinary practice, after a period of research during which their advantages were much questioned. On the other hand, the method of mercurial frictions has been extended, regulated, and its indications have been more closely defined. It would, therefore, appear as if gastric administration, which for a long time was the most common practice, had almost fallen into disuse.

It must be admitted that the gastric method has serious disadvantages, particularly when mercurial preparations are given in the pill form; and we must confess that it is in this way that the great majority of physicians prescribe them, at the request of the patients, who ask to have a remedy that can readily be kept out of sight. Now, there is no question that the pill form renders the treatment much less certain, as the entire dissolution of the pill and absorption of its contents cannot be relied on, and as, in addition to this, when it does dissolve, the active substance which it contains may have a harmful effect on the mucous membrane of the digestive tract. The two great objections, therefore, to pills are that their action is uncertain and that they may produce gastric or gastro-intestinal disturbance; and in consequence it is with right that the partisans of intramuscular injections have violently attacked the pill method. It should, however, be remarked that this method is not the only way in which these preparations can be given by the stomach; far from it.

I need scarcely remind you of the ancient therapeutic axiom, "Corpora non agunt nisi soluta." This idea struck me in 1888,

and since that time I have been experimenting to see what can be done with the gastric method in the treatment of syphilis by using nothing but mercurial compounds *in solution.* In so doing I have only taken up again the therapeutic methods of the old syphilographers, who used to prescribe Van Swieten's solution, or the biniodide of hydrargyrum, in water or in syrup. These mercurial solutions I have prescribed in two manners,—either in a single large dose or in small, repeated doses.

In giving large doses I prescribe the total amount to be taken either once a day in the morning before the first meal, or else in two doses before the two principal meals. The first of these plans is more convenient, as it allows the patients to go about their business for the remainder of the day without having to think of the treatment; but it has the drawback of being less efficacious and of sometimes irritating the digestive tract.

When the small, repeated doses are prescribed, the total daily amount of the remedy should be divided into four or six doses and given before the different meals and in the intervals between them. This latter method is the one that I personally much prefer, and it has seemed to me to be far more efficacious.

Let us now see what are the *drawbacks* to this method, and we will then point out its advantages.

The first drawback to any gastric method is the irritation produced in the stomach and intestines by the drug. This irritation, so common with the pill method, is much less to be apprehended when drugs are given dissolved and diluted in a sufficient amount of liquid: milk, particularly, also some natural alkaline waters, have been found to be excellent vehicles for this purpose. The irritative effect, however, is almost entirely absent when the dose of an active substance is divided up into several parts. It will be found to be quite unusual for patients not to tolerate mercurial preparations when given in these small and divided doses. Some of them, it is true, complain of slight colics during the first two or three days of the treatment, but these soon cease. Some patients even, paradoxical as it may seem, find that their digestion is improved by the treatment, and that their motions are more regular; sometimes, however (although this is much more unusual), constipation continues. In any case, we have in the judicious use of paregoric an excellent means of counteracting the bad effects which dissolved mercurial

preparations may have on the digestive tube. Thus, in case of pain in the stomach, or diarrhœa, I have the patient add to each dose of the remedy from five to twenty drops of French paregoric, according to individual susceptibilities, and have in this way always succeeded in doing away with these symptoms.

A second drawback is the repulsion which some patients have for the remedy. This dislike is almost insurmountable with some of them, and yet I think that with certain means it can be almost always overcome. When a patient does not dislike milk, the biniodide or bichloride mixed with a certain amount of this liquid loses a portion of its disagreeable taste, which can be still further masked with some aromatic, such as the essence of aniseed. For patients who do not like milk the remedy can be incorporated in a syrup aromatized to taste. Still, I admit, in some very rare cases I have found patients absolutely refuse to take the solutions of mercurial preparations. It is a curious fact that in private practice I have met this repugnance or gastric intolerance in only a single serious case, all my other private patients in whom it was present having relatively mild forms of syphilis; this, however, was not the case at the hospital, where several women suffering from serious forms of syphilis have declared that they were absolutely unable to get down Van Swieten's solution.

A third drawback to this method is its inconvenience. It is, I admit, sometimes impracticable in town, either because patients can really not take their medicine several times a day, on account of their occupations or of the necessity there may be that they should not be seen taking medicine, or because they are constantly forgetting to take it at the proper hour; this is evidently a serious drawback. Still, this drawback, which is almost prohibitive in certain cases, can be somewhat lessened by supplying the patient with a small bottle, with the doses marked, to carry with him, and containing the amount of solution necessary for the day's treatment; these doses can be diluted with any liquid when the time comes to take them. Or, better still, he can be supplied with small tabloids containing each one dose, which have only to be put in a little water or milk to dissolve in a lapse of time varying from a few seconds to two or three minutes. The patient could also be trusted with small dragées to swallow or to allow to melt in the mouth; but I think it is much better to dissolve the pill in a con-

siderable amount of liquid, in order to avoid as far as possible the irritation produced by mercurial compounds on the mucous membranes.

It is evident that the inconvenience of the small and frequent dose is obviated by giving the soluble mercurial compound in the morning in a single dose. This method can, therefore, be recommended to syphilitic patients who have a tolerant digestive tract and a mild form of the disease; but whenever the digestive tract is in poor order or the malady takes a serious form, every effort should be made to get the patient to take the dissolved mercurial compound in small and repeated doses, in spite of the real difficulties entailed thereby.

When we consider the *advantages* that this method of administering mercury presents, we find that they are considerable, and I shall endeavor to point them out as succinctly as possible.

To begin with, in this way we know, almost as exactly as by the injection method, what is the precise dose of mercurial compound that the patient absorbs; this is a very material advantage over the method of administration by pills, frictions, or inhalations. Next, the irritating local effect on the digestive tube is reduced to its lowest expression. Finally, the patient can carry out the entire treatment alone; it is not necessary for him to be continually seeing his physician, and he runs no risk of pain, of abscesses, or of being obliged to give up his occupations momentarily, as may be the case when the injection method is used.

The efficacy of the internal treatment by solutions of mercurial compounds is really most pronounced, especially when the small, repeated dose is used; and it is to this point that we wish to draw special attention. In this way we often give twenty grammes of Van Swieten's solution in four or six doses to syphilitic patients who had been taking without appreciable result two, three, and even four pills of bichloride of mercury of one centigramme each per diem, and we see their manifestations disappear in one or two weeks under the influence of this treatment. As Van Swieten's solution contains one gramme of bichloride per litre, equivalent to one centigramme per ten grammes, we were giving only from one and a half to two centigrammes of that salt per diem,—that is to say, far less mercury than when the pills were being taken, and yet we obtained a therapeutic result infinitely superior. Since in the two cases the

same drug was being used, the failure in one case and success in the other must be solely attributed to the way in which the drug was administered.

My long clinical experience has furnished abundant evidence that the activity of a given dose of a mercurial solution is much increased by giving it several times during the day, instead of all in a single dose. Not only does the stomach tolerate the remedy better, but the therapeutic result is far superior, and almost analogous in curative effect to injections of insoluble mercurial compounds, such as gray oil or calomel.

During the twelve years that I have used this method there have been very few syphilitic manifestations that I have found to resist its action. In private practice I have seen it fail only in certain cases of tertiary psoriasiform lesions of the palms of the hands and soles of the feet, and in certain more unusual cases yet of superficial syphilitic sclerosis of the mouth, particularly of the tongue. In these peculiar and very rebellious manifestations of syphilis, nothing acts so well as an injection of calomel, and I prefer to resort to that course at once when the patients agree. But in all cases of syphilis where we were dealing with destructive gummata, with tertiary ulcero-serpiginous lesions, with malignant periostitis, and with other serious syphilitic affections, the frequent small doses of a mercurial solution given internally, alone or combined with iodide of potassium, have always succeeded well.

Since I have been at the head of one of the large venereal services of the Paris hospitals, I have been able by using this process systematically to lessen very materially the indications and necessity for frictions and injections of mercurial compounds, both soluble and insoluble. Still, I am not exclusive, and whenever a patient complains of gastro-intestinal intolerance, or of want of progress by this method, I immediately use another. This conclusion reached, the following percentage is practically the daily average in our wards: out of sixty patients that we have constantly under treatment for syphilis, not more than ten per cent. require frictions or intramuscular injections. Since I have had charge of these wards about two thousand patients have been successfully treated by Van Swieten's solution.

The foregoing remarks are sufficient to show that, after having relied too exclusively on the treatment of syphilis by the digestive

tract, the tendency among practitioners now is to give it up too readily in favor of methods, such as frictions, which are much more irksome and difficult for the patient to employ, and the injection of soluble and insoluble mercurial compounds, the former being always troublesome in their method of application, and the latter painful and sometimes even dangerous. But physicians should know how to give mercury by the stomach, and they should remember that remedies to act must be given in solution; it should also be understood that when dissolved their efficacy is much greater in small and frequent doses than in a single large one.

Let us not then discard the gastric method in treating syphilis; like all the others,—frictions, injections, etc.,—it has its indications, advantages, and usefulness. It appears to me likely always to render immense service in private practice with patients who cannot afford the expense of treatment by injections; but, in order that it may be sure to act, it is necessary, as far as possible (and this cannot be repeated too many times), to give the remedies not in pills, but in solution, and in small and frequent doses.

THE TREATMENT OF MUCOMEMBRANOUS COLITIS.

A SPECIAL ARTICLE.

BY PROFESSOR ALBERT MATHIEU,
Physician to the Hospitals of Paris.

There has been considerable discussion as to whether mucomembranous colitis is due to an inflammation of the mucous membrane of the intestines or is a primary neurosis of these viscera. There is no doubt that neurotic symptoms, local as well as general, form an important part of the manifestations of the disease in many patients. I cannot think, however, that it has been demonstrated that the painful symptoms which are so prominent in this disorder are the direct expression of a disturbance only of the innervation of the gastro-intestinal tract, nor that the diarrhœic symptoms are due to a secretory neurosis of the large intestine without inflammatory changes. It seems to me that the true basis of the disease is always an irritation of the intestinal mucous membrane. If the pain and the mucous hypersecretion, together with the spasmodic contractions of the colon, assume greater intensity when the neurotic condition is worse, or if, as is true, the mucomembranous colitis be more liable to occur and be more persistent in neurotic individuals, these phenomena manifest themselves only because under these circumstances the disease finds a soil more favorably disposed for its development. Whether or not the neurotic element plays a primary or a secondary *rôle* in the pathogenesis or symptomatology, especially of the severer forms of mucomembranous colitis, it is certain that any treatment to be successful must take account first of all of the neurotic elements in the case. All therapeutists agree that the treatment of the disease depends essentially on the successful therapy of the nervous condition of the patient.

The symptoms and etiological factors which furnish the prin-

cipal indications for the treatment of mucomembranous colitis are the following: First, constipation is the rule, and it is often spasmodic. The diarrhœa, which occurs at irregular intervals, is always the result of an exacerbation of the disease or of a catarrhal complication. Second, in mucomembranous colitis a secretory irritation and desquamation of the mucous membrane of the colon always exist. Whether this secretory irritation is of nervous origin, or is due to a superficial inflammatory condition the lesions of which can be demonstrated histologically, is as yet in doubt. The third element in the etiology that gives us hints as to treatment is the special seriousness that mucomembranous colitis takes on in individuals who are predisposed to it by a preceding neurotic condition. In such persons the painful symptoms of the disease assume unusual intensity.

As a secondary element in this neurotic condition we must not pass over the existence of visceral ptoses, which tend to exaggerate the constipation and consequently the other symptoms of mucomembranous colitis, either by hindering the peristalsis of the gastro-intestinal tract or by inducing irritative conditions in the terminal nerve-filaments of the intestines, because of the way they are pulled upon, and thus causing reflex excitation of the large abdominal nervous plexuses. Locally the neurotic condition provokes or exaggerates a state of hyperæsthesia in the walls of the large intestines. This induces spasmodic contractures; undoubtedly auto-intoxication from absorption of food before this has been properly prepared is another important feature of the disease.

The local condition and the general nervous state often react one upon the other. A vicious cycle is formed: the local symptoms cause an exaggeration of the general nervous condition, while the latter makes the localized pain more unbearable. Other elements in the vicious cycle are the consequent disturbance of digestion, the restriction of the amount of food assimilated, and also undoubtedly auto-intoxication from absorption of food before being properly prepared. All these unite to produce a progressive emaciation and anæmia with increasing nervousness. In turn the enfeeblement of the general system aggravates the local intestinal conditions. There is no doubt that mucomembranous colitis is often associated with gastric dyspepsia. Just how this association occurs is not clear, but it is important, when stomachic symptoms exist, not to

neglect them in the course of the treatment of the intestinal disorder.

The first element of the disease that requires treatment is the constipation. Mucomembranous colitis is never satisfactorily relieved so long as constipation persists. It is important, moreover, to treat the constipation without provoking any reaction in the intestine, for this would readily lead to an increase in its irritative sensitiveness and to its hypersecretion and tendency to spasm. In this, as in all cases of habitual constipation, the ideal treatment is to bring about regulation of the evacuations by purely hygienic means. At least only physical factors should be employed and no cathartic should be given. Drastic purgatives inevitably make the disease worse and must be avoided at all hazards.

In cases of chronic constipation a diet rich in residual material is usually advised. Hence vegetables which are composed largely of indigestible detritus are recommended. These serve by their presence to excite intestinal peristalsis and so to bring about regularity of the stools. Von Noorden has particularly insisted on the usefulness for this purpose of green vegetables, of so-called graham or whole-wheat bread, and of vegetable substances generally that are rich in coarse cellulose material. Needless to say, most authorities are of the same opinion. On the contrary, for the treatment of mucomembranous colitis patients are usually advised to take food that leaves little undigested residue. The idea is that indigestible material will increase the irritation of the intestines If the prescription to take only bland substances be followed, however, the constipation is rendered persistent. It must not be forgotten that constipation is really one of the fundamental causes of mucomembranous colitis.

There is no doubt that in mild cases of mucomembranous colitis a vegetable diet that leaves abundant residue is of decided value. If the disease is of pronounced character, however, a dietary of this kind is often badly borne. The consumption of even slightly indigestible material excites attacks of pain, and these are followed, if the dietetic indiscretion is continued, by true colic and by diarrhœic complications. Often even before the intestinal symptoms show the error of the diet the stomach has refused to co-operate in the digestion of this unsuitable material. Heart-burn, a feeling of pressure in the gastric region, and even crampy pains may occur.

Under these circumstances it is absolutely necessary to return to a dietary from which are eliminated as far as possible all cellulose substances, such as the shells of grains, vegetable fibres, and all other indigestible vegetable *débris.*

Von Noorden also advises an increase of the amount of fat in the dietary. Fresh butter, eaten cold or melted in mashed vegetables, seems especially suitable. This method of dietetic treatment succeeds very well, as a rule. Often in cases of mucomembranous colitis it becomes necessary to increase the amount of food taken. In their anxiety to avoid bringing on attacks of colic by eating, patients have acquired a sort of sitophobia, a fear of taking food. They have grown thin and as a consequence have become more and more nervous. It is important, then, to increase their nutrition, to make them regain the weight which they have lost and so to restore their former strength. For this purpose butter, when it is well borne, is excellent. It is an article of diet very rich in caloric and has at the same time a marked tendency to overcome constipation. One of nature's most effective materials for causing regularity of defecation is fat, and no fat is more digestible than the products of milk and none more easily obtainable than butter. This must be looked upon, then, as an important element in the treatment of the constipation which underlies all mucomembranous colitis. If the former can be overcome by simple dietetic measures, there is every reason to hope that in the course of time the latter will disappear.

For the constipation of mucomembranous colitis, as for constipation in general, massage is frequently recommended. It is not always well borne. As a rule, it should be employed in no case where it causes any pain. It is particularly contraindicated wherever hyperæsthesia and painful contractions of the intestine are liable to take place. This method of treatment has been much abused. It may easily cause more harm than good and is likely to be of benefit only in mild cases.

Large injections of warm water or, better, copious washings out of the intestine are usually very beneficial. They represent one of the most important factors in the cure of mucomembranous colitis. Their action is not as simple as it may seem. By their warmth they have a calming effect on the mucous membrane and this tends to limit the muscular spasm. They often put an end

to the constipation. It is also clear that their simple cleansing action is of importance. They cause the evacuation of a number of pathogenic germs that have found a favorable breeding place in the intestine. The injections mechanically produce a relative asepsis of the lower intestinal tract. In order that they may be beneficial, however, it is very important that they be administered in a suitable manner. They should never be given at high pressure; this is an absolutely essential condition for their favorable therapeutic effect. The observations of a number of experienced clinicians have shown that liquid penetrates deeply into the intestine only when it is injected gently. An elevation of from twenty to forty centimetres (eight to sixteen inches) above the patient gives the proper momentum to the inflowing current. My own clinical experience has shown me that even a moderate increase of the pressure may easily provoke spasm of the intestine. In serious cases the degree of spasm thus produced may be sufficient to cause symptoms of intestinal occlusion. The most suitable temperature is from 38° to 40° C. (100° to 104° F.).

These large injections can be rendered antiseptic, or at least alterative of the condition of the mucous membrane, by the addition of various medicinal substances. With regard to the employment of drugs, however, it is important to remember that they must not be irritant and should be used in reasonably large dilutions. Spasm of the intestine may be excited quite as readily by irritant drugs as by injections at too high pressure.

There is no doubt that enemata of olive oil or oil of sweet almonds may be of service. A number of observers have found them highly beneficial. When large injections of water do not cause a satisfactory evacuation of fecal material, from one hundred to one hundred and fifty grammes (three to five ounces) of oil should be thrown into the rectum in the evening and retained during the night, followed next morning by a large injection of boiled water. This treatment will produce a very complete evacuation.

The ideal treatment of the constipation of mucomembranous colitis, as of constipation in general, is to avoid recourse to laxative drugs. Unfortunately, this is not always practicable, and drugs must at times be employed, which, however, should be done carefully. Materials as little irritant as possible are prescribed and all drastic remedies excluded. Personally, I prefer castor oil, which

I direct to be taken in the morning in small doses immediately before breakfast. A teaspoonful or two in a little syrup of cloves, which perfectly covers its disagreeable taste, is usually sufficient. At times I alternate between castor oil and large injections. Cascara sagrada is often an efficient remedy. A mixture of magnesia, cream of tartar, and precipitated sulphur in equal quantities is also useful; so are podophyllin and euonymin. Drastic purgatives, such as aloes, colocynth, jalap,—in a word, all drugs that produce irritation and congestion of the mucous membrane,—must be avoided.

Belladonna is indicated whenever there is noticeable spasmodic contraction of the intestines, especially when the spasmodic contracture of the colon is painful. It usually lessens the pain, and often when ordinary laxatives fail it produces a tendency to thorough intestinal evacuation by causing relaxation of the intestinal walls. Saline purgatives ought to be reserved for cases in which there are alternate attacks of diarrhœa and constipation, or forced diarrhœa with fetid stools. The hyperæsthesia of the mucous membrane and the spasmodic contraction of the intestine often occur together. It is the combination of these two elements that sometimes produces that anomalous form of constipation in which we get the paradoxic action of morphine: instead of locking up the intestine, the various alkaloids of opium have an exactly contrary effect and, by lessening the spasm, permit evacuation of the bowels.

In mild cases the cure of the constipation is sufficient to bring about relief of the mucomembranous colitis. In old cases, however, where the symptoms have become severe, we must not only relieve the irritation of the mucous membrane, but also heal the inflammatory condition which has resulted therefrom. For this purpose antiseptic and alterative medication of the mucous membrane is necessary. Personally I have found that the addition of a certain amount of hamamelis to the water used in large injections produces a happy effect. Others have recommended saturated solutions of boric acid or of naphtol. These I have not employed, considering them too irritating. I prefer borax to boric acid, and do not use more than five or six grammes to a litre (about one and one-half drachms to the quart) of water. I have derived benefit from the salicylates and chloride of sodium in solutions of from two to five grammes

per litre. Nothnagel recommends a solution of sodium chloride of about the strength of normal salt solution.

Of the irritant drugs that may be used in this way ichthyol and nitrate of silver seem to be the only remedies justified by consistent success. A number of French physicians have given ichthyol in the strength of a teaspoonful of ammonium or sodium ichthyolate to the litre. As a routine practice I employ a neutral solution of ichthyolate of ammonium. I begin with a teaspoonful per litre and increase the dose to two or three or even four or five teaspoonfuls if there are no signs of reactive irritation of the colon. When these large injections of ichthyolate solution are administered, it is usual to see the mucomembranous stools diminish and to note a seemingly miraculous disappearance of the painful symptoms.

Many authorities recommend nitrate of silver as the best drug for the treatment of mucomembranous colitis. I employ it only in cases in which there has been acute exacerbation and dysenteric symptoms are present,—that is, when there are tenesmus, bloody stools, pain on palpation along the colon, especially in the descending portion, and in the sigmoid flexure. I never use it in solutions of more than twenty or thirty centigrammes to the litre (from three to five grains to the quart) of distilled water. It is well to have the intestines washed out beforehand with a large injection of simple boiled water. Under this treatment the dysenteric symptoms disappear rapidly: the painful attacks become rare, the stools cease to contain mucus, or at least they become bloodless, and then the nitrate of silver may be superseded by milder remedies.

Dujardin-Beaumetz recommended tincture of iodine in the strength of ten drops per litre of water. His prescription has not, however, been much employed by others. Encouraged by the good effects produced by picric acid in certain eczematous conditions, Chéron has advised its use in large injections for the treatment of mucomembranous colitis. He directs that after a stool half a litre of water, to which has been added a teaspoonful of picric acid solution of the strength of 1 to 120, be injected and retained.

Two sets of symptoms, closely united to one another, particularly demand treatment in mucomembranous colitis. These are the pain and the neurotic manifestations. When the pain is moderate, it is, as a rule, necessary to do little more than control the constipation by some of the methods that we have indi-

cated, preferably by large warm injections, given at low pressure and very slowly. If given rapidly and at high pressure, they provoke spasms and colic. Though stated before, this fact cannot be too much emphasized. Gentleness is the secret of success in this method of treatment, and it is the most effective remedy that we possess for a very obstinate disease. Warm applications and warm baths have the same influence, but, of course, should be used in moderation.

Of the internal remedies which may be used for the abdominal pain, belladonna should be most frequently employed. Codeine is also useful. The narcotics that produce constipation must be avoided. Belladonna in sufficient dose (and for this no general rule can be given, each patient being a law to himself) usually relaxes the spasm, quiets the pain, and in this way produces a true gentle laxative effect. At times relief of pain and relaxation of spasm can be obtained by the use of opium and its alkaloids. Their administration sometimes leads, as we have said, to the disappearance of the constipation. Their effects, however, should be carefully watched, as they may, of course, increase the constipation. Some clinicians have suggested that constipation should be deliberately encouraged by the use of opium, so as to set the intestines absolutely at rest for eight or ten days. In certain very severe cases, where the pains and the irritative excitability of the intestine are intense, such a treatment may be considered. For such cases opium and morphine are the best remedies, but this method of treatment should be used with great discretion and its employment carefully guarded. It is a well-known fact that patients often feel better when constipated and when they have not even the desire to evacuate the intestine. Defecation, however, must take place sooner or later, and the continuance of the constipation makes the condition when evacuation does occur much more painful and exhausting to the patient. After prolonged continuance of constipation acute crises are apt to ensue and a dysenteric condition develops that is extremely annoying. These symptoms are always to be feared when the eventual cleaning out comes. Codeine has this advantage over morphine, that it does not produce constipation so easily. For that reason I frequently employ the drug myself.

Germain Sée recommends the fatty extract of cannabis indica and menthol for the pain. Cannabis indica may be useful if given

them in obtaining this knowledge. It is scientific, it is practical, and ... 'busy practitioner' as to the student.

"While the title page indicates that this is a third edition, yet it is *practically a new book*. The order in which the subjects were treated in former editions has been changed and much of the matter practically rewritten, not a little being entirely new. Pediatrics has kept pace with the rapid advances made by other branches of the medical sciences, and this book represents this advanced knowledge. It is much more thoroughly illustrated than were the former editions, the illustrations not only being excellent ones but of remarkable practical value. Many are in colors. There is no padding and, while concisely written, clearness of expression has not been sacrificed to brevity.

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in doses of three centigrammes a day, but I have never been able to persuade myself that menthol had any action upon the intestine.

For the condition of general nervousness that so commonly accompanies mucomembranous colitis hydrotherapy is the most important method of treatment, especially the use of warm water in various forms. Douches and jets of warm water and warm baths should all be employed. Warm water produces a distinct calmative effect on the systemic irritability and lessens the painful local phenomena. It is because of its free employment that mucomembranous colitis is treated so successfully at the various warm springs, as at Luxeuil and particularly Plombières. Most of the visitors are really there improved not only temporarily but sometimes for good. At Plombières in recent years much more use has been made of large injections at low pressure, and the consequence is a distinct increase in the number of patients who are permanently benefited. When the general neurotic phenomena are more important than those of the colitis, and the abdominal symptoms are not very marked nor the neurasthenia very prominent, hydrotherapy with cool water should be tried. Often these patients are helped by sedative drugs, particularly the alkaline bromides. I use these remedies, however, but very seldom, for fear of producing or aggravating symptoms of gastric dyspepsia. As drug sedatives codeine and valerianate of ammonium have in my experience proved the least harmful.

As a rule, drugs should not be employed in the treatment of mucomembranous colitis. The general nervous condition should be treated by hygienic, dietetic, and other of the so-called physical therapeutic methods, rather than by medication. It has often been noticed that the victims of mucomembranous colitis have a tendency to mental depression. Their nervous organization is usually such that it predisposes them to this despondency and then their sufferings add to the mental anxiety and increase their tendency to see the darker side of things. Patients may improve in this respect under change of air and environment, but relapses are frequent. The best means to buoy them up morally is to improve their physical condition. Very often, however, as in the case of most neurotic individuals, moral hygiene is as important as the material hygiene. Many of these patients eat too little, and the amount of nourishment they take must be increased. They should as far as possible

avoid overwork and fatigue, and not be allowed to undergo serious worry or excessive intellectual exercise. Heavy responsibility involving tension of the mind is to be avoided. Mental suggestion must be used to put them in a more cheerful condition, and the physician should obtain and maintain mental influence over them for this purpose. It is important that he should win their confidence, and it is surprising how much can be done for the relief of patients by such simple means. Sometimes the rest-cure may be advisable because of the intensity of the neurasthenic symptoms.

The different varieties of mucomembranous colitis require special treatment. In mild forms scarcely more is necessary than to improve intestinal digestion and do away with the tendency to constipation. In these cases the symptoms will disappear under the influence of a diet more rich in vegetables, of gentle abdominal massage, and of simple laxatives. These forms of the disease are mainly interesting because of the possibility of their developing into its severe types. In nervous patients and in women who suffer from visceral ptoses it is important not to allow constipation to continue for a long time, as there is grave risk that obstinate mucomembranous colitis will develop.

In the ordinary forms of mucomembranous colitis as we see it, with constipation, mucomembranous stools, and crises of pain, the treatment requires much more care. The constipation and colitis must be overcome by the use of a rigid dietary from which are excluded all spices and pastry, also the heavier meats that contain indigestible residue and vegetables that leave a large amount of waste material. On every second day alternately castor oil and large injections at low pressure should be given. Warm applications should be applied to the abdomen and frequent warm baths recommended.

In the very serious form, with frequent and prolonged relapses, most important is the treatment of the systemic neurosis by frequent hot applications on the abdomen and long warm baths, and by the administration, as nerve sedatives, of belladonna and codeine, with valerianate of ammonium, and more rarely the bromides. If the patients are discouraged and depressed, they should be recommended to change their manner of life, and even to submit for a time to a veritable isolation from over-sympathetic but unwise friends. The more serious forms of mucomembranous colitis are relatively common among patients suffering from visceral ptoses. In such cases

it may be necessary (and the doctor should have no hesitation in recommending it) to keep the patient constantly in bed for fifteen or twenty days. During this time warm applications over the abdomen should be made frequently and large warm baths should be taken, also copious injections, given very slowly and at low pressure, so that they will be well borne. Patients should not be permitted to get out of bed until their painful conditions have been sensibly relieved, and then they should be recommended to wear a flannel bandage around the abdomen.

The worst cases of mucomembranous colitis are often a source of anxiety because of their severity and obstinacy to treatment. In women the nervous symptoms become so marked that the patients should be treated as if suffering from a major neurosis.

I cannot leave the subject of the treatment of mucomembranous colitis without mentioning the possibility of benefit from surgical intervention. The disease is in some cases so obstinate to ordinary treatment, produces such serious symptoms, and makes life so miserable that it is no wonder that surgery has been suggested for its relief. To my own knowledge two very severe cases of the disease have been treated with success by the establishment of an artificial anus. This good result seems to me to indicate that there was a spasmodic condition of the intestine in the colon at a point below the new orifice established by the surgeon. This spasmodic contracture or stenosis was the cause of the constipation and of the consequent irritation of the bowel. So, while most cases improve under careful medical treatment continued for a sufficiently long period, it must not be forgotten that surgery may afford relief in cases which are hopeless in so far as medical treatment is concerned.

A MODIFIED TECHNIQUE IN THE SPINAL INJECTION OF COCAINE.

BY A. GUINARD, M.D.,
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I HAVE had the good fortune to be able, with the help of MM. Ravaut and Aubourg, to study in my wards in Dubois Hospital the spinal use of cocaine. It is hardly necessary for me to say that the different methods known by the terms centrifugation and cryoscopy, as well as the condition called isotony of the cephalic liquid, are no more familiar to me than they are to the majority of other surgeons, and that without the valuable help of these qualified assistants it would not have been possible for me to ascertain the details which have already been published in part by them in the paper they read recently before the biological society. The researches of which I now wish to speak have been made in connection with about twenty patients, and the results obtained have been so absolutely similar that I think they must be quite constant. M. Ravaut made the examinations by means of liquid drawn from the spinal column through fresh punctures four or five hours after the use of cocaine, again in four or five days, and finally in from twelve to fifteen days.

A first striking fact is the following: the liquid obtained by puncture four or five hours after the original injection is no longer transparent, but is found to deposit a film of pus; in addition to this there is fibrinous coagulation, as occurs in liquid drawn from the pleural cavity. Examination on slides, as well as the culture method, showed that there was no trace of infection, and that the liquid remained absolutely aseptic, which set my mind fully at rest as regards my technique. It is, nevertheless, true that an injection of cocaine into the arachnoid space gives rise to an abundant outpouring of polynuclear elements and of lymphocytes, which evidently come from the vessels of the pia mater. After a few days another puncture shows that the liquid is clearer, that the polynuclear elements are less numerous, while the lymphocytes predomi-

nate. Finally, after two weeks another puncture shows in all cases a transparent, normal liquid, no longer containing any figured element.

It is, I think, very easy to interpret these data, which have been clearly ascertained by MM. Ravaut and Aubourg in my wards.

Every injection of cocaine into the spinal liquid gives rise to a more or less active process of defence on the part of the pia mater for the protection of the nervous centres, and this process manifests itself by the presence of these abundant polynuclear elements and lymphocytes, and even by exudation of fibrin when the reaction is more energetic. These facts supply an easy explanation of the phenomena that follow an injection of cocaine, and which have been described under the faulty term of meningismus. The process is nothing else than an aseptic form of meningitis, or, in order to be more exact, than congestion of the pia mater, and M. Ravaut's further examinations show that this congestion of the pia mater leaves no traces at the end of two weeks. This explains why the patient whose history M. Walther published gradually recovered from all his meningeal symptoms in twelve days and was in condition to leave the hospital in two weeks.

The second fact clearly demonstrated by the researches of MM. Ravaut and Aubourg is that the symptoms which follow the spinal use of cocaine—headache, rise of temperature, and vomiting—depend for their intensity on the degree of reaction furnished by each individual,—that is to say, on whether the defensive process of leucocytosis is more or less energetic. In other words, when a patient has only a little headache and vomiting, a minimum of polynuclear elements will be found in the liquid; and, conversely, when the headache and rise of temperature are very marked, a later puncture will show the spinal liquid to be fibrinous, in hypertension, and no longer transparent. In such a case the liquid spouts out, whereas at the first puncture it came out slowly drop by drop.

In order to diminish as far as possible the intensity of the defensive process that gives rise to these symptoms, I have adopted a modification in the technique of the spinal injection, of which M. Cadol speaks in his thesis, without specifying whether he had ever seen it used. I draw off into a little sterilized receptacle two cubic centimetres of spinal liquid, which is the equivalent of about fifty drops. Then, with a standard dropper gauged to one millimetre, I

let fall into this liquid four drops of a cocaine solution of which two drops contain one centigramme. Finally I draw this mixture into my syringe and inject it into the arachnoid space. It seems to me that this technique is a logical one, and that it is satisfactory to the mind. In this way an organic liquid is injected, uniting conditions of temperature and isotony that are useful if not indispensable.

I can say that I now never see any of the accidents, such as headache and vomiting, that many of my colleagues have found so annoying as to lead them to give up altogether the spinal injection of cocaine. I can hardly say whether or not this is due to the modified technique that I have adopted; it should also be remarked that, so far, I can speak only on the strength of about fifty cases.

M. Chaput relates that after his operations he has a puncture made for the purpose of preventing the headache, etc., and in this connection I can call attention to an interesting point. Before I began to use the concentrated solution of cocaine, and to reinject the spinal liquid used as a vehicle, there had been in my wards a few cases of severe headache due to the operation. These cases I never saw, because the headache had always disappeared before I reached the hospital the following morning, owing to the second puncture made by my house-surgeon, M. Aubourg. It should be noted that a considerable amount of liquid must be withdrawn for this purpose,—from sixteen to twenty cubic centimetres. As the liquid flows out through the needle the patient feels relief, and the instrument is not withdrawn until the headache has practically disappeared. This later puncture should, then, be reserved for the treatment of headache; I do not think it wise to recommend it as a preventive, as it seems to me useless to make in all cases a puncture for the purpose of preventing a symptom that will occur only once in a while. It is quite time to make the puncture when the headache appears; this is the course followed by my house-surgeon, and by it he succeeds in relieving this very distressing symptom. I have thus been able to say that I have never seen any intense headache in these cases, because in the majority of them it does not occur, and when it does occur in the hours that follow the operation, it is cured by my house-surgeon before I get there the next day.

One word now as to the technique of the puncture. I think that no surgeon can boast of reaching the spinal cavity at every attempt. On several occasions I have failed altogether, and on letting one of

my house-surgeons try he has succeeded with ease. On the other hand, they had the greatest difficulty one evening in succeeding in a case with which the same morning I had had no trouble whatever. This is a rather delicate point, and I am not sure that the puncture alone will not constitute a difficulty which will prevent to some extent the diffusion of the method.

A good deal has been said of late about *epidural* injections. These are quite different, but, since I am on the subject, I may as well state that in my hands they have not proved as useful as I hoped. It had occurred to me that after a big laparotomy an injection of cocaine in the region of the sacrum might put an end to the pain that we are in the habit of quieting for the first two or three days by injections of morphine. Such, however, did not turn out to be the case. I have also tried to relieve by this new means unfortunate women suffering from very painful uterine cancer that had got beyond the point at which it could be operated; the injections gave no relief whatever, even when I diluted my solution and injected from thirty to forty cubic centimetres of water containing two centigrammes of cocaine. I therefore think that these epidural injections are only useful medically, and not surgically, to introduce certain drugs into the system or to quiet for the time being certain forms of pain radiating into the lower limbs.

To sum up what I wish to say, I may state:

1. That the minute and painstaking researches of MM. Ravaut and Aubourg show that an injection into the arachnoid space gives rise to a defensive movement in the vessels (no doubt by vasodilatation), which is accompanied by a leucocytic infiltration into the spinal liquid and by hypertension. The more intense this defensive process is, and this depends on individual susceptibility, the greater the headache, rise of temperature, etc.

2. My technique, which consists in using the spinal liquid itself as a vehicle for the cocaine, appears to me logically to be a near approach to the ideal, for by this method but few foreign elements are introduced.

PATHOGENESIS AND PROPHYLAXIS OF VARICOSE VEINS.

CLINICAL LECTURE DELIVERED

BY PROFESSOR PIERRE DELBET,

Professor Agrégé in Surgery at the University of Paris and Surgeon to the Hospitals of Paris.

GENTLEMEN,—The subject of varicose veins of the leg is an extremely ordinary one, and it might reasonably be thought that our advancing science of medicine must have exhausted it. As a matter of fact, however, our treatment of the condition is not satisfactory, as a rule, our knowledge of its etiology is far from complete, and our ideas as to its prophylaxis are by no means accordant. It is much more important that we should, if possible, learn to recognize the classes of people who are especially liable to the development of varicose veins, and by proper prophylaxis prevent the occurrence of the malady, than that we should invent new methods for its treatment. This must be my excuse for taking up this hackneyed subject.

It is generally admitted that varicose veins are due to an affection of the venous walls,—that is, to a form of chronic phlebitis,—which is considered to be dependent on a special diathesis, a sort of constitutional dystrophy of the vascular walls, and this diathesis is attributed to the existence of a constitutional tendency that has been called arthritism here in France and is usually spoken of elsewhere as a rheumatic condition. The study of a large number of cases of the disease, however, has convinced me that varicose veins of the leg are generally due to a set of causes entirely different from those mentioned.

In order to make my ideas in the matter clear, I shall classify varicose veins of the lower extremity according to their location. In the great majority of cases—at least ninety-eight out of every hundred—the varicosities occur in the course of the distribution of the internal saphenous vein; these may be called typical varices. Some of the[illegible] see[illegible] into the region supplied by the

external saphena, but this is only apparent, and is due to the fact that there exist in some people certain collateral branches or anastomoses which are more or less abnormal. When these branches become dilated, they form irregular varicosities, but they belong to the same group as those first mentioned.

There are other varicose veins that may be called atypical. They belong to the external saphenous and its branches, or at times to the superficial ischiatic veins, or to the superficial obturator veins. It seems to me that ischiatic or obturator varicosities are practically always due to pregnancy. For the present, however, we shall dismiss the atypical varicosities. Their comparative infrequency makes them of but slight interest, besides which we are not so sure of their etiology.

Some five years ago I showed by experiment that the valves of a saphenous vein which appears to be entirely normal in size and thickness may be totally incompetent. I then endeavored by a series of observations to determine in what proportion of cases this incompetency exists. When the saphena is extensively dilated, its incompetence is easy to demonstrate: Trendelenburg's signs furnish positive proof. The demonstration is not so easy to make when the saphenous is of normal size. I think, however, that after a little exercise its incompetency can be determined by placing the finger upon a dilated vein while the patient stands erect. A sense of fulness is easily noticed which shows that the pressure within the vessel is excessive. As a rule demonstrations in the erect position are open to suspicion, because there are so many elements in the problem, but, however, there is a method of procedure that excludes the possibility of error.

The patient is examined while lying down, after the varicose veins have been emptied by the elevation of the lower extremities. A rubber band is put around the thigh and another around the leg just above the union of the lower and middle thirds. I draw these two bands moderately tight, but sufficient always to stop the circulation in the subcutaneous veins. After having fixed the bands in position by two hæmostatic forceps, I ask the patient to stand up, and wait for a moment in order to see if there does not exist some anastomosis through which the blood finds its way into the branches of the saphenous vein. If the varicose veins refill in spite of the two bands, I make the patient lie down again and reapply the lower

band a little higher than before, for the venous anastomoses between the superficial and deep venous systems practically always occur in the lower third of the leg. When I find that the superficial veins included between my two bands do not fill up again, I am sure that no deep anastomosis of any importance exists and so there is no chance for a mistake. Then the patient is put on his feet once more and I remove the upper band, leaving the lower one in place. If now the varicosities refill, it is a sign that the valves of the saphena are incompetent. I have found whenever varicosities exist that they always fill up. This was rather surprising to me, and led me to question the accuracy of the present teaching with regard to the valves in the saphenous vein. In a series of observations made upon the cadaver it was seen that near the mouth of the saphena there exist one or two pairs of valves which are not only competent, but are so resistant that they maintain their position against a pressure of three litres of water.

Clinically, however, I have found it invariably the rule that when varicosities exist the saphena and its valves are incompetent. In two hundred and thirty-two patients there was not a single exception. There are, of course, degrees of incompetency. In certain patients in whom the saphenous vein is dilated one can see as soon as the upper band is removed that the blood fills up the varicosities almost at once. When the saphenous is not dilated especially, the reflux of blood is not so rapid, the calibre of the vein not being sufficient to accommodate such a quantity of blood, and the filling of the varicosities is slower. They fill, however, from above downward, while, as is well known, the blood circulating in the veins flows in the opposite direction, showing that the valves at the orifice are incompetent.

Here, then, are two important facts: in the normal condition the valves of the mouth of the saphenous are not only competent, but powerful; in all those affected with typical varicosities these valves have been rendered incompetent. Is this incompetency of the saphenous valves a cause or an effect of the varicose veins? You have noticed that varicose veins begin in the leg and not in the thigh. I have often seen patients in whom the valves were already incompetent and only slight varicosities of the leg existed,—that is to say, that the varicose condition was just beginning. In fifty-six out of my two hundred and thirty-two patients I found the valves

incompetent at a time when the trunk of the saphena in the thigh showed no trace of dilatation. These facts, it seems to me, prove beyond a doubt that the incompetence of the valves of the saphenous vein precedes the varicose dilatations and is not caused by them. The constant concurrence of the two conditions shows that there is between them some direct relationship of cause and effect; hence, if the valvular incompetence is not the effect, it must be the cause.

How does the valvular incompetence act to produce the dilatation of the veins? It seems clear to me that it is by permitting an increase of intravenous pressure. Whenever in a normal vein the pressure above a valve becomes greater than that below it, the valve is thrown back into the lumen of the vein, and, if it is competent, it supports the excessive pressure without allowing any reflux of blood. Below the valve then the circulation is stopped, but the pressure augments little by little. In order that it shall increase notably some cause must act upon the distal segment of the vein. There are no other possible causes for this additional pressure except the *vis a tergo* from the heart and muscular contraction. The pressure cannot rise, then, to any very notable degree. I have found by experiment that the pressure in the distal portion of the cut saphenous vein is six centimetres of mercury during muscular effort and that excessive energy must be put forth to cause it to rise to ten centimetres.

When the valves are incompetent the case is quite different: pressure is transmitted from the large veins above without encountering any obstacle, so that the slightest increase thereof within the thoracic cavity or the abdomen is felt in the venous circulation all the way to the feet. During muscular effort the pressure in the saphenous vein rises to sixteen centimetres of mercury; during a violent effort it mounts as high as twenty-six centimetres. Bramann showed that the pressure in the neighborhood of an arteriovenous aneurism is no higher than this. In a case of axillary aneurism communicating with the vein the pressure in an anastomotic branch between the cephalic and basilic veins was scarcely more than ten centimetres of mercury. As is well known, arteriovenous aneurism by causing excessive pressure upon the venous walls dilates the veins. Genuine varicosities are thus produced, which have been mistaken for ordinary varicose veins when the site of the aneurism was in the lower limbs.

It is evident, then, that the same mechanical conditions as exist in arteriovenous aneurism come into play when there is incompetency of the valves in the saphenous veins. The excessive pressure upon the walls of the veins produces the same effect as the presence of an aneurism. This shows why the standing position has so much effect upon the development of varicosities and why they occur almost exclusively in the lower limbs. In the theory of a chronic inflammatory process—the so-called phlebitis—these mechanical factors in the etiology of varicose veins are not given their due importance.

We are forced to the conclusion, then, that varicose veins in the legs are due to incompetency in the valves of the external saphenous vein. The next question of importance is, what is the cause of this valvular incompetency? Clinical experience throws a great deal of light on this question. First, it is worthy of attention that unilateral varicosities are relatively frequent. During five months that I had charge of the distribution of bandages in the public service of the city I distributed twenty-four hundred and thirty-five rubber stockings for varicose veins to fourteen hundred and sixty persons. Out of fourteen hundred and sixty patients there were four hundred and sixty-seven—that is to say, more than one-third of the whole number—who suffered from varicosities on only one side. It is not uncommon to see individuals who have one leg covered with enormous varicose veins while the other is absolutely free from them or presents only a small trace of varicosis. This difference in the pathological condition of the veins on the two sides of the body remains even to an advanced age, though the varices may have developed in early youth, sometimes between the ages of fifteen and twenty.

This comparatively frequent one-sidedness does not accord well with the theory of vascular lesions dependent on some fault of systemic nutrition, or a diathesis. Moreover, it would be very strange if a lesion depending on a general pathological condition should be localized to one rather small segment of the venous system. With regard to other varicosities besides those which occur in the leg—varicocele, for instance, and hemorrhoids—the mechanical theory furnishes the best explanation. The influence of the erect position can be readily recognized in the development of both these forms of varicosities, which are besides influenced by variations of press-

ure consequent upon intra-abdominal pressure, muscular effort, and so forth.

One hundred and six patients have been able to tell me very approximately at what age their varicosities began to develop,—an extremely interesting point. I classified them in five-year groups, and found that most of the varices began between the ages of fifteen and thirty years. The maximum was reached in the period from fifteen to twenty. In sixty-eight of the one hundred and six patients (about two-thirds of the cases) the varicose dilatations began before thirty years of age.

Were the varicosities due to diathesis, it would be surprising to find them developing most frequently before the thirtieth year of age, when nutrition is at its best. The occurrence of the greatest number of them between the ages of sixteen and twenty years seems to be due to the fact that at this time men take up occupations, as apprentices, book-keepers, clerks, and so forth, that require them to be in erect positions for long periods. When people have congenital weakness and tendency to incompetency of the valves of the saphenous vein, these are easily overtaxed at this time, and varicosities develop as a consequence.

This explanation serves to show very well why it is that people who follow avocations requiring much standing—as clerks, cooks, footmen, waiters, etc.—are especially liable to develop varicose veins of the leg. The histories of the patients show that the varicosities became prominent and developed rapidly shortly after such or such a standing occupation was entered upon or while military service was being performed. In some cases the varicosities have appeared almost suddenly. One man told me that his varices were caused by his falling from a tree when a boy. Another informed me that at the age of fourteen, while making a very violent muscular effort, he had a sensation as of something tearing in his legs, and his veins swelled up immediately afterwards. These stories resemble the histories of the development in many cases of hernia; yet we have no hesitancy in believing those who talk of their hernias in this way, while we scarcely listen to accounts of the sudden occurrence of varicosities. In this we are wrong, being unduly influenced by a preconceived notion in etiology that assumes the gradual development of varices.

These histories when collated seem to prove beyond doubt that

the varicosities were due to a congenital weakness of the valves of the saphenous vein. Ordinary varices of the leg are thus associated with the rare forms of varix that occur in other parts and are due to serious congenital malformation of the venous system. The latter usually accompany angiomas.

As to the varicosities which develop later in life, and that may be spoken of as delayed or senile varicosities, it is not so easy to determine their exact cause. They are probably due to deterioration in the wear and tear of life of valves originally not overstrong.

Must we conclude, then, that a constitutional dystrophy has nothing to do with the production of varicosities? There is no doubt that the general condition of the individual has great influence on the progress and extent of varicose development. With an equal valvular incompetence certain persons acquire in a few weeks a set of varices that actually deform their legs by the prominence of the enormous veins; others, because of their better nutrition, have at the end of many years only a few small varicose dilatations.

Congenital feebleness of the valves is one of the most common forms in which dystrophic conditions in ancestors are transmitted to descendants. This heredity serves to throw light on the important question of the prophylaxis of the disease. It is evident that in families in which varicosities are known to occur attention should be directed not to the correction of a presumed arthritic condition, but to the choice of occupations in which the development of this annoying condition of the leg veins may be avoided. It is extremely difficult to relieve the symptoms of varicosis. An ounce of prevention is here worth a pound of cure, and the family physician should endeavor to save his patients from the influence of hereditary tendencies in the vascular system.

I do not, however, insist very much on this point. I have tried to throw light upon the important *rôle* that incompetency of the valves plays in the development of varicosity, for only correct views as to etiology can lead to rational therapeusis. I think that we are justified in forming the conclusion that venous dilatations such as occur in typical varicose veins are always of mechanical origin. Like the enlargements in arteriovenous aneurism, they are caused by excessive internal pressure, resulting from incompetency of the valves of the internal saphena, and this incompetency is usually due to congenital weakness of the saphenous valves.

THE CLIMATE OF SOUTHERN CALIFORNIA.

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CLIMATIC conditions are those of the air we breathe. The atmosphere far above the earth is substantially the same everywhere, but at the surface it varies somewhat, the few variations being determined by the physical conditions that mostly operate locally. I should say that in the study of climate we ought first to consider temperature; second, moisture, including the manifestations of storms and fogs; third, the weight of the air, the barometric pressure determined by altitude, by moisture in the air, by movements of storms, and perhaps by other influences to a slight degree; fourth, the amount of sunshine, which affects the temperature of the air as well as that of the earth's surface; and, fifth, dissemination of gases, microbes, and dust. The variations are due to the differing physical conditions of different regions, and, as physical conditions vary with the parts of the earth's surface, it may be said that there are no two climates exactly alike. The physical features that are the chief factors in determining these elements of climate are altitude of the surface of the earth, latitude, and large bodies of water—oceans, lakes, and rivers. It is practically impossible that for any two regions of considerable size and extent, these physical features should be identical.

If we study the climate of Southern California on this basis, we shall find conditions that I think are somewhat remarkable; certainly they are unique in physical geography. There is a coast line running in a general direction from northwest to southeast, and back of it, near by, are high mountains. The Pacific Ocean is an enormous body of cold water, there being no warm currents that touch the coast in this region. Here is a range of mountains averaging five thousand feet in height, extending easterly from near the coast, then southerly, leaving between it and the ocean an irregular plateau, varying in width from two to sixty miles, and in

altitude from sea-level up to fifteen hundred feet elevation at the foot of the mountains. It is this plateau that is inviting as a place of residence for both the sick and the well, and it is this that is usually meant whenever Southern California is mentioned as a place to live in. The latitude of the country is only a little north of that of Cairo in Egypt. We rarely consider how far south the region is in our calculations about Southern California. These physical peculiarities inevitably produce certain qualities of climate, and just what they are might almost have been predicted without actual observation. It is so far south that the sunshine heats the earth remarkably, and the air on the surface is warmed and rises; other air rushes in to take its place, usually colder air from the ocean; this meets with less impediment than desert air from north and east of the mountains would. Hence we have an ocean current of air flowing northeast by day a large part of the time.

The atmosphere of Southern California is drier than that of the East and drier than that of most sea-coast countries; it is very much drier north and east of the mountains. The relative humidity is lower much of the time, and the water in the air is actually less. Hence, as soon as the sun goes out of sight, the radiation from the surface of the earth is so great that the atmospheric stratum above it cools rapidly, especially on the higher levels; it becomes heavy in consequence, and flows down towards the sea all night. This gives a very curious condition as to regular air currents; the air flows landward all day and seaward all night on nearly every day of sunshine throughout the year, and the exceptions are due mostly to storm movements of some kind. If it were not for the physical conditions described, this region, so far from being a land of comfort, would be uncomfortable. But the contiguity of high mountains and cold ocean, with a strip of habitable land between—for this latitude a unique situation—makes it, along the coast, a very comfortable region at all seasons of the year.

There are some drawbacks in the occurrence of occasional stiff winds, mostly in the fall and early winter; and at those points farthest from the sea the temperature is sometimes disagreeably warm during the middle of the day in summer. The nights are nearly always cool,—cool to human sensation even in summer,—especially in houses well ventilated in north and south directions. Looking at the map one can readily see the peculiar and providential

adjustment of the sea to the mountains, a physical arrangement calculated for the production of a climate that is favorable to man in a most remarkable degree. The air is relatively clean; it comes from over the ocean, the desert, and the mountains, and is uncontaminated by any disease-producing thing.

The physical discomforts incident to living in this region are about twenty-five per cent. of those experienced in the East and middle West. The agreeableness of the several seasons differs in the estimates of different people; but within twenty miles of the coast a consensus would probably place spring first, autumn last, and summer and winter about equal. Farther inland summer would be put down as least pleasant.

East of the mountains is the Colorado desert, a low region, where the surface of the earth is at some points below the level of the ocean. The desert region is very dry, and in summer so hot and uncomfortable that people always shun it if they can. Northeast of the plateau of comfort is another desert, the Mojave, which is always very hot in summer. Within twenty or thirty miles of the sea-coast the summers are on the average very much less disagreeable than they are in the East. Mid-day is liable to be hot, but the heat is tempered by the ocean breeze, and the nights are all made substantially cool by the breeze from the mountains.

The rainfall in Southern California is about one-third of that in the Mississippi Valley and lake regions, and occurs mostly in the winter and early spring. There are in this region occasional fogs, when the atmosphere is temporarily saturated with moisture. Most of the time the percentage of water in the air is considerably less here than it is in the East. It is greater, however, than it is in Arizona, New Mexico, or Utah.

The barometer moves very little. In Los Angeles the range is only one-fourth as much as it is in Chicago or Buffalo. The cause of this difference is too large a problem to discuss here. The fact is evident, and is probably beneficial to the sick. The temperature of Southern California is higher than that of the Mississippi Valley by an average of from five to ten degrees in summer and from twenty to thirty degrees in winter; yet the relative humidity is so low that the sensible temperature is seven and one-half degrees less than in the Mississippi Valley and east of it,—that is, the sensibility of the human body to the presence of heat shows it to be less

by that measure. In the regions east of the Rocky Mountains the sensible temperature averages in summer 55° to 75° F.; west of and including that mountain range, it is 50° to 65°.[1] The rule is that relatively the temperature is high in the sunshine and low in shadow and at night, by reason of the rapid radiation of heat from the earth due to low humidity. Wherever low humidity exists there is a rapid change of temperature when the sun goes out of sight. The amount of water in the air is so small that the stars at night are seen perceptibly more clearly than in the East, where the humidity is greater. The drier air has more the quality of diathermancy.[2]

The fogs of Southern California have constituted a subject of endless debate and confusion. They seem to flow in from the ocean in the night or early morning after a warm day; as they can be seen to travel landward, people naturally infer that the ocean has something to do with them. It has, but the fog is not from the ocean; rather, the cold air from the sea lowers the temperature of the warmer and moister land air, and when this is saturated a fog results; but at the instant of precipitation there is less moisture present than there was five minutes before. At that moment the warm air contained, say, four grains of water to the cubic foot, and the cold sea air held perhaps three and a half grains, while at the instant the fog appears there is from the mixture of the two not more than three and three-quarters grains to the cubic foot, less by one-fourth grain than the clear air held at first. As soon as the

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[1] These figures are taken from the publications of the Weather Bureau, and represent a method of calculation that has, I learn, been abandoned as being subject to some inaccuracy. But I believe that the numbers given above correspond with the experience of people so far as they are able to state their physical sensations in figures.

[2] Diathermancy of the air at Sierra Madre (sixteen miles north of Los Angeles) in summer, average of repeated observations made early in the afternoon.

Elevation above sea-level	1250 feet.
Difference between temperature in the shade and in the sun, standard thermometer, average	33° F.
Difference as shown by black bulb thermometer incased in long test-tube, corked, average	74.5° F.
Highest point registered by black bulb thermometer, average	162.5° F.

(Paper by the author, Transactions of the Association of American Physicians, 1891.)

sun comes up and warms the earth and air, the fog disappears by being dissolved, again to become the invisible moisture of the atmosphere.

The following table shows at a glance the relative temperatures, humidity, cloudiness, rainfall, and barometer range for the southwest region in comparison with Denver and Chicago, which cities may, as to climate, be regarded as typical respectively of the highest altitudes in the dry belt and of the moister regions east of them.

	Mean summer temperature—F.	Mean winter temperature—F.	Humidity, relative. Mean percentage of saturation.	Humidity, actual. Grains of water to cubic foot of air.	Cloudiness, percentage of, by day.	Rainfall, inches per annum.	Barometer range, in fractions of an inch—average.
Chicago	68°	22°	72	2.80	51	38	.565
Denver	69	29	53	2.14	38	15	.395
Prescott	70	37	74	2.20	24	14	. .
Yuma	90	55	46	4.12	17	2	.264
Los Angeles	69	54	66	4.00	34	15	.142
San Diego	68	54	69	4.19	42	10	.174
Eastern Foothills (Redlands, Riverside, San Bernardino) .	75.3	54.7	64.4	. .	28.9	15	. .
Western Foothills (Sierra Madre, Pasadena)	71	52.6	65	. .	30	16	.300

The influence of the climate of Southern California on the health of people going there is both potent and peculiar. It is a paradise for the aged and for children. Old people here piece out happy lives, because of the relief from extremes of weather. Children are singularly free from mortal diseases peculiar to them; they have fewer such than in any other place I have ever known; especially is this true of the bowel troubles incident to the summer season.

The great majority of the invalids who come to Southern California are of the tuberculous class. The large proportion of recoveries here furnishes a strong argument against the theory that high altitudes are indispensable for tuberculous patients. Altitude sometimes improves nutrition by increasing the number of red blood-corpuscles, and perhaps otherwise also; but experience in the surgical treatment of lung tuberculosis, and I believe in medical treatment as well, has shown that the intense expansion of the lungs in these cases is detrimental rather than otherwise. Altitude can do no substantial good in this way.

The experience of Southern California with tuberculosis also supports the contention that intense dryness of atmosphere is not so important as it has been thought. Of course, relatively, Southern California is more dry than the eastern regions of the United States, but it is not nearly as dry as Arizona. In Arizona patients who had expectorated much fluid sputum experience a lessening of this symptom, but I am not aware of any proof that the tuberculosis fails to progress much the same as when the expectoration is more liquid. Absence of cough, however, means more quiet of the diseased lung, which is a positive benefit. Another advantage of Arizona climate is the fewness of stormy days that keep patients indoors; but I have known of many recoveries directly on the sea-coast, where the humidity is not low. The climate pre-eminently needed for tuberculosis is such as enables patients to live practically out of doors much of the time day and night. This, I am sure, is a correct theory, and Southern California fulfils the conditions in a large measure.

Many patients come to the Southwest with chronic bronchitis, catarrh, and asthma. Those with chronic bronchitis do well; many with catarrhs of the throat get better, and some with beginning deafness improve greatly. A few of the cases of pure nasal catarrh do not improve, but this condition portends no harm, and we ought to be ashamed of ourselves for having so long allowed the public to make such a bugbear of it and for having locally tinkered with it so much. Asthma is always an interesting study in California, because while cases improve markedly in one region, in others only a few miles distant they do badly. Some of these, if they stay near the mountains, are free from their wheezing. They can with impunity go down towards the sea during the day, but they must get home before dark or be seized with a paroxysm of wheezing.

Quite a number of patients have come for relief from chronic rheumatoid troubles, and nearly all have recovered or improved. New-comers frequently complain of neuralgic or myalgic pain. Such patients must learn to clothe themselves properly at night and during cloudy days; the pain often results from lack of clothes. This trouble is frequently called rheumatism. It is not rheumatism, and is not dangerous, but it is disagreeable. It is a great mistake to suppose that Southern California is a tropical country where one may always go thinly clad.

I have never been able to identify a case of thermic fever or sun-

stroke. I have known of numerous cases of persons somewhat overcome by heat, but they never had elevation of temperature and the symptoms that accompany what we call thermic fever, and they did not die. Hydrophobia is almost unknown, though one case occurred last year in Pasadena. Another curious fact is the relative absence of ordinary lobar pneumonia among the resident population. I have lived in Southern California three-fourths of the time for ten years and have seen a great many patients with all sorts of pulmonary troubles, including catarrhal pneumonia, but these were substantially all of tuberculous origin. Two or three persons had possibly true lobar pneumonia; they, however, had just arrived from the East.

THE CLIMATOLOGY OF AUGUSTA, GEORGIA.

BY THOMAS D. COLEMAN, M.D.,

Professor of Medicine in the Medical Department of the University of Georgia; Physician to the Augusta City Hospital and Lamar Hospital.

THE fact that climate tends to eliminate or reduce to a minimum some forms of disease, and to favor the development of others, cannot be gainsaid. Some diseases thrive more luxuriantly in and are associated with certain localities, just as peculiarities of person and provincialisms of speech characterize a people. Asiatic cholera has usually been focussed at Mecca as its point of origin, the bubonic plague in the far East, yellow fever in the tropics, etc.

Longfellow has said, "As turning the logs will make a dull fire burn, so change of studies a dull brain." I have been told by farmers that sheep will not thrive well if left long in one pasture; of other animals the same is true, and man is no exception to the rule. A change of climate is often beneficial to persons who are in perfect health; it is of still greater benefit to those whose bodies are diseased. If such be the case, and I think it is beyond the possibility of dispute, it behooves us to make a closer study of climate in relation to disease.

This point may be contested by those who advocate the home treatment of tuberculosis, but in my judgment this is simply a compromise measure. I am far from being willing to affirm that tuberculosis is incurable in the locality where it develops, but I am unalterable in my belief that tuberculous individuals would stand a better chance of a speedy and perfect recovery if they sought some region other than that in which the disease developed.

I believe Augusta, Georgia, to have a climate exceedingly well adapted to the cure of tuberculous patients, and yet I should unhesitatingly advise residents of that region who develop the disease there to seek some other climate. These considerations have led me to feel that a short presentation of the advantages and disadvantages of Augusta's climate may prove profitable to the readers of the CLINICS.

In treating of the climatology of this region I shall limit my consideration largely to that portion of Augusta that is known as a health-resort, and upon which Augusta should have been built,—viz., Summerville. It is not possible to separate the two portions, however, or to give the full value of Summerville's climate, inasmuch as the meteorological data are all recorded by the United States Signal Service down in the city proper, three hundred feet below the Sand Hills upon whose summit Summerville is located.

Augusta is situated upon the Georgia side of the Savannah River, which along this region separates the States of Georgia and South Carolina. By the river route it is two hundred and thirty-one miles from the Atlantic Ocean, and in an air line about ninety or one hundred miles. The city proper has an elevation of one hundred and sixty-seven feet above the sea-level. With its immediate suburbs it has a population of between fifty thousand and sixty thousand people. It is one of the oldest as well as one of the most beautiful cities in the South, and in industrial importance the third city in the State. A huge canal seven miles in length furnishes water to run its mills and other industries; from the number and size of its cotton-mills it has been styled the Lowell of the South. It has about eighteen miles of electric railway, most of which is double tracked, and is modern in construction, equipment, and conduct. Besides its public schools it has a high school for boys, the Richmond Academy, the Tubman High School for girls, a Jesuit college, and the Medical Department of the University of Georgia. Strangers sojourning here may have school facilities for their children if they desire. There are also a modern opera-house, a public library, and churches of the more prominent religious denominations.

The city proper is quite level, and the streets are wider and more beautiful than those of any other city with which I am acquainted. The chief residence thoroughfare, Greene Street, is one hundred and seventy-five feet wide, and throughout its length of several miles extend four rows of majestic elms and oaks; most of these trees are half a century or more old. Along the central portion vehicles are not allowed to pass; this, being stone curbed and grass plotted, is reserved for pedestrians and as a playground for children.

The city has a water-supply that is not excelled by that of any

city in America; it comes from the Savannah River, which, from its origin in the water-shed of the Blue Ridge to Augusta, has upon its banks neither city, village, nor hamlet. As if for additional precaution, it breaks into shoals which extend irregularly for forty or fifty miles above Augusta. This water is taken three miles above the city, carried by mains to reservoirs on the hill-top, where it is filtered, and thence delivered to the city mains. The city has an excellent sewerage system, which, in my opinion, plays an important part in its healthfulness.

The death-rate of Augusta has decreased from 23.36 per thousand inhabitants in 1880 to 17.15 per thousand in 1899. During the same period the death-rate from typhoid fever has diminished from one in 41.7 to one in 133.6.

Two conditions contribute to make the death-rate of Augusta higher than it should be. One of these is the fact that forty per cent. of the population are negroes. As a race they are shiftless and their health is not so well taken care of now as it was before the war. Their houses are not well built, and in winter they huddle together in small, ill-ventilated rooms to keep warm. Their death-rate in tuberculosis, for instance, is twice as high as that of the white race, whereas before the war the disease was hardly known among them. The other unfavorable condition consists in the large factory element of white people, in many of whom are found the elements of poverty and thriftlessness.

Augusta is easy of access by any of the ten railroads which centre there, and also by the Savannah River, as it is the head of navigation for that stream. Crossing the river at this point is a row of sand hills which, beginning in the region of Chester, South Carolina, pass down through Aiken, Augusta, and on into Georgia. On the crest of these hills is the village of Summerville, which has for more than a hundred years been an aristocratic suburb of Augusta, and on account of its healthfulness was early known as Mount Salubrity; it is also perhaps more generally known as the Sand Hills. This suburb is connected with Augusta by fine gravel roads and by an electric line which runs a fifteen-minute schedule to and from the city, and the borders of the village of Summerville touch the city limits of Augusta. From this elevation one gets a sweep of landscape that is rarely excelled by mountain scenery, the view extending far over the hills of South Carolina and the plateaux and hills of Georgia.

The village of Summerville has churches and schools of its own, and is governed by an independent town council. Here is also located the Bon Air Hotel, which stands easily with the first of the winter resorts of the South. This hotel has accommodations for two hundred and fifty guests, and the demand upon it is so great that an annex having thirty or forty rooms is now in course of construction. Connected with the hotel is an eighteen-hole golf-course, said to be the best in the South, and an elegant club-house is to be built upon it during the coming year. In addition to the hotel there are numerous boarding-houses on the hill, and many of the private families will take a few boarders. The chief amusements consist in riding, driving, and bicycling over the splendid gravel roadways which ramify in every direction through Richmond County, and in hunting, fishing, and playing golf.

These hills are covered with pines, elms, oaks, and such grasses as will grow in a sandy soil. Wild flowers are abundant, and the honeysuckle, cherokee roses, and yellow jessamine make the region most attractive in the spring. The soil is very sandy, and it is necessary to go down from eighty to one hundred and fifty feet before striking water, so that the region is always dry. No water accumulates on the surface of the ground, it being like a huge filter; and one can, in a few minutes after the hardest rains, go out and walk for miles without getting the feet wet. Bad drainage is, therefore, practically impossible.

The meteorologic data for this health-resort are not accessible, and almost the sole data that we have are from the United States Signal Service Station located three hundred feet below and in the river valley. I think it is unfortunate that the Government does not locate its bureau at its arsenal, which is a splendid property on the summit of the hill. A register was kept there from 1849 to 1869. The observations taken there during that period, at sunrise, 9 A.M., 3 P.M., and 9 P.M., show the mean average temperature to be as follows: January, 46.7°; February, 50.7°; March, 58.8°; April, 65.1°; May, 72.2°; June, 80.9°; August, 79.7°; September, 72.8°; October, 63.5°; November, 53.8°; December, 46.3°. Mean temperature of spring, 65.3°; summer, 79.9°; autumn, 63.4°; and winter, 47.9°.

Mean number of fair days two hundred and thirty-eight, cloudy days seventy. Snow about two days in every three years. Unfortu-

CLIMATE OF AUGUSTA, GEORGIA, LATITUDE, 33° 28′ N.; LONGITUDE, 81° 54′ W.

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
Temperature:												
Average or normal for 29 years	47°	50°	56°	54°	73°	79°	81°	79°	75°	64°	54°	48°
Average daily range for 20 years	18.1	19.4	21.4	22	21.9	19.9	19	18.3	18.5	20.8	20.7	19.5
Mean of warmest for 29 years	56	58	62	69	77	83	85	84	79	71	60	57
Mean of coldest for 29 years	39	38	50	59	69	74	78	76	70	58	48	38
Highest of maximum for 29 years	80	84	89	93	100	108	105	105	101	94	85	78
Lowest of minimum for 29 years	6	3	22	29	41	46	57	58	41	29	23	7
Average date of last killing frost for 29 years, March 18.												
Average date of first killing frost for 29 years, November 8.												
Humidity:												
Average relative for 5 years	74	71	70	66	66	70	76	80	74	74	78	76
Average absolute for 5 years	2.457	2.550	3.414	3.936	5.555	7.441	7.980	8.240	6.563	4.872	3.539	2.366
Precipitation:												
Average in inches for 29 years	4.35	4.30	4.97	3.48	3.28	4.50	5.52	5.27	3.80	2.42	3.08	3.36
Wind:												
Prevailing direction for 29 years	W.	W.	W.	W.	S.E.	S.	S.E.	N.E.	N.E.	N.E.	N.E.	W.
Average velocity in miles per hour	4.5	7.0	7.0	6.5	5.8	5.4	5.1	5.0	5.2	6.2	5.5	6.0
Weather:												
Average number clear and fair days for 5 years	20	18	22	23	25	28	23	28	23	25	22	21
Largest number clear days for 5 years	19	23	22	25	28	29	26	26	27	27	25	24
Smallest number clear days for 5 years	16	14	12	22	22	28	19	18	21	21	19	19
Average number cloudy days for 5 years	11	10	9	7	6	7	8	8	7	6	8	10
Largest number cloudy days for 5 years	15	14	19	8	9	7	12	13	9	10	11	12
Smallest number cloudy days for 5 years	12	5	9	5	3	1	5	5	3	4	5	7
Average number rainy days for 29 years	11	10	10	8	8	11	12	13	7	7	8	9
Smallest number rainy days for 5 years	7	2	9	7	3	6	8	10	5	2	5	6
Largest number rainy days for 5 years	13	14	15	11	13	15	13	19	8	8	13	11

nately, no record of the humidity was made. Dr. Kenworthy, in an article on the climatology of Florida, has shown that, in an observation extending over from three to five years for the months of November, December, January, February, and March, the mean temperature of Cannes was 50.8°; Augusta, 51.4°; Aiken, 50.3°; Jacksonville, 58.7°. He also pointed out that for these months the mean relative humidity was at Cannes and Mentone, 72.4, Augusta, Georgia, 68.9, and at Jacksonville, 68.8 per cent. The mean relative humidity of Augusta, therefore (the city in the valley, not the village of Summerville on the hill-top), was 2.5° less than that of Cannes and Mentone, and one-tenth of a degree more than that of Jacksonville, Florida. Moisture stands in our lower districts for a long time, whereas on the hill-tops it is impossible for it to remain, and I have often noticed a mist over the low country when the atmosphere was perfectly clear about the hills.

The accompanying table for the city of Augusta extends over a period of twenty-nine years, and is furnished me by the United States Signal Service Office at this place.

In studying the foregoing table it will be noted that Augusta has not a tropical climate. The chief advantages would seem to consist in, first, the fact that we have a bracing climate that holds neither the inhospitable rigors of the North nor the debilitating and depressing influences of the far South; second, it is moderately dry, and increased or diminished humidity can be enjoyed by getting down into the river valley or farther up on the hill-top; third, the absence of sudden and decided atmospheric changes which characterize regions farther north; fourth, the large percentage of sunshiny days, which makes it possible to spend most of the time out of doors, a point insisted upon by medical practitioners in the treatment of tuberculosis and other diseases running a more or less protracted course.

As to those cases which do best in this region I am limited almost exclusively to my own observations, as the village of Summerville keeps no mortuary records.

Blodgett, in his "Climatology of the United States," shows that the ratio of deaths from consumption to total mortality was less in Georgia than in any other State in the Union. Dr. Huntington Richards, in the "Reference Hand-book of the Medical Sciences," vol. i. page 443, writes: "The following figures, deduced by calcu-

lation from the statistics of the United States Census for 1880, showing the deaths attributed to consumption which occurred in every ten thousand of population during the census year, are herewith presented to the reader: Maine, 28.18; Vermont, 24.46; Massachusetts, 29.20; Rhode Island, 24.98; New York, 25.29; New Hampshire, 24.96; New Jersey, 23.25; Connecticut, 22.67; Philadelphia, 18.85; and Georgia, 11.14."

With regard to tuberculosis, which is, both in distribution and destructiveness, the greatest scourge of the human race, no region, it seems, is suited to all cases; if such a locality existed, it would be the Mecca for them, and would doubtless be shunned by the healthy. It is well known that some authorities advocate the home treatment chiefly because it is the best that can be done under the circumstances; others prefer a mountain climate; still others the arid stretches of New Mexico and Arizona; others, again, such a mild and equable climate as that enjoyed by Augusta and regions farther south. Tubercular cases with cardiac complications certainly do better here than in mountain regions, and until Arizona and New Mexico have further development it is not practicable except in a few localities to send any but robust cases there, and these may be treated nearer home.

To sum up, the climate in and around Augusta (and in this I include Aiken, for I do not believe there is any appreciable difference in these places) is, according to my experience, well adapted for the treatment of tuberculosis, and, especially when complicated by heart lesions, and of cases of bronchitis and asthma; for the last-named class of cases it seems especially adapted. The equable and mild climate makes it suitable for those suffering from nephritis, with its complications; rheumatic and cardiac cases, as a rule, do well here; and it is especially well suited as a place of convalescence, and for those who desire to avoid the rigors of the northern winter and its changeable spring seasons.

SELECTED FORMULÆ.

FOR COUGHS.

Heroin, $\frac{1}{12}$ gr.;
Ammon. hypophos., 3 gr.;
Hyoscyami, 1 gr.;
Pin. alb. cort., 3½ gr.;
Bals. tolutan., ¼ gr.;
Glycerini puri, 1 dr.
M. S.—For each dose.

BRONCHITIS.

Terpinol,
Sodii benzoatis, āā 2 gr.;
Sacch. alb., q.s.
M. et ft. pil. no. i. S.—Six to twelve daily.

NIGHT-SWEATS OF PHTHISIS.

Agaricin, 7½ gr.;
Dover's powder, 2 dr.;
Powd. marshmallow,
Mucil. of acacia, āā 1 dr.
M. et divid. in pil. no. c. S.—One or two pills at night. *Siefert.*

Tellurate of sodium, 0.10–0.20 gramme;
Alcohol, 50 grammes.
M. S.—A teaspoonful morning and night.
Journ. des Praticiens.

EPSOM SALTS MADE PALATABLE.

Magnes. sulphat., ½ oz.;
Ac. sulph. dil., 2 min.;
Syr. limonis, 1½ oz.;
Aquæ, q.s. ad 2 oz.
S.—Take at one dose.

PALATABLE EFFERVESCING QUININE.

Quinin. sulphat., 4.0 grammes;
Acid. citric., 10.0 grammes;
Syr. simplicis,
Syr. aurantii cort.,
Aquæ destillat., āā, q.s. ad 20 grammes.
M. S.—Add ten or more drops to fifty grammes of water containing thirty centigrammes of sodium bicarbonate. *Therapist.*

SYPHILIS.

Acidi arsenosi,
Hydr. chlor. corros.,
Auri et sodii chloridi, āā 0.1;
Extr. sarsaparillæ,
Extr. gentianæ,
Extr. opii, āā 0. 2.
M., ft. mass., et in pil. xxx. div. S.—One pill morning and night.

PERTUSSIS.

The following is to be applied to the pharynx:
Acid. phenic. cryst., 0.75 gramme;
Glycerini puri, 10 grammes;
Syr. tolutani, 5 grammes.
M. S.—External use. *Guida.*

MERCURIAL STOMATITIS.

Potass. chlorat., 5 dr.;
Sapo. medic., 2½ dr.;
Calcii carbonat., 5 dr.;
Ol. menth. pip., 15 min.;
Ol. caryophylli, 4 min.
M. S.—Use as a dentrifice. *Practitioner.*

GOUT.

Tinct. colchici sem., 2½ dr.;
Lithii benzoatis, 2½ dr.;
Sodii phosphatis, 5 dr.;
Aquæ cinnamoni, q.s. ad 4 oz.
M. S.—Dessertspoonful two or three times daily. *Butler.*

VAGINITIS.

Aluminis,
Sod. biborat., āā 30;
Quin. sulph., 1;
Ol. thymi,
Ac. carbol., āā 30 gtt.;
Glycerini, 200.
M. S.—Add a soupspoonful to a quart of hot water. Inject two or three times a day.

PSORIASIS.

Acidi salicylici,
Acidi pyrogallici,
Ammon. sulph. ichthyol., āā 46 gr.;
Ol. oliv., 2½ dr.;
Adipis lanæ, 4 oz.
M. S.—Apply twice daily. This produces no irritation nor discoloration of the skin.
Unna.

SYPHILITIC ERUPTIONS AND OTHER SKIN DISEASES.

Red oxide of mercury,
Oxide of zinc, āā 20 gr.;
Resorcin, 10 gr.;
Lanolin,
Vaseline, āā 1½ oz.
M. S.—External use, to be applied frequently.
An old country practitioner used to divide skin diseases into two great classes,—first, those that were healed by the use of zinc ointment, and, second, those that were not! The above prescription will be found useful in many cases, and possesses a number of advantages over the ordinary U. S. P. *Unguentum Zinci Oxidi.*

MORPHINE AND ALCOHOL HABITS.

Ammon. brom., 5 gr.;
Ext. bellad. fld.,
Ext. nuc. vom. fld.,
Ext. cannabis ind. fld., āā 2 min.;
Aquæ, ad 2 dr.

M. S.—One dose, four times daily. *Wenthers.*

HAIR TONICS.

Acid. salicylic., 15 gr.;
Resorcini, ½ gr.;
Tinct. cantharidis, ½ oz.;
Tinct. capsici, 1 dr.;
Saponin., 1 dr.;
Lanolin., 1 oz.;
Aq. rosæ, ad 10 oz.

Melt the lanolin, dissolve the saponin in the same quantity of water, and incorporate the two. Dissolve the acid and resorcin in the tinctures and rose water respectively, to make up the required bulk. More spirit may replace the rose water if it is required. Every night it should be well brushed into the roots of the hair, which should then be dried with a soft towel.

This is an effective substitute for the popular "Erasmus Wilson's hair lotion." Containing no alkali, it has no tendency to bleach the hair or cause the affection which it is employed to cure. It is both antiseptic and stimulative.

Quinin. sulphat., 20 gr.;
Ac. sulph. dil., q.s.;
Tinct. cantharidis, 1 oz.;
Hazelin., 2 oz.;
Glycerin., 1 oz.;
Aq. flor. aurant., ad 8 oz.

The method of applying lotions is not always satisfactory, especially if they contain fats or glycerin. After a vigorous application all excess should be removed with a towel in the same way that one would dry one's hands after an application to them for the same reason.

The Practitioner.

HOURS FOR FEEDING YOUNG INFANTS.

1 week.	1 to 6 weeks.	6 weeks to 4 months.	4 to 8 months.	8 to 12 months.
4 A.M.	3 A.M.	3 A.M.	7 A.M.	7 A.M.
7 "	7 "	7 "	10 "	10.30 "
9 "	9.30 "	10 "	1 P.M.	2 P.M.
11 "	12 M.	1 P.M.	4 "	6 "
1 P.M.	2.30 P.M.	4 "	7 "	10 "
3 "	5 "	7 "	10 "	
5 "	7.30 "	10 "		
7 "	10 "			
9 "				
12 "				

DIET FROM ONE YEAR TO EIGHTEEN MONTHS.

Breakfast (6 to 7 A.M.).—(1) A glass of milk with stale bread broken into it. (2) Oatmeal, arrowroot, wheaten grits, farina, hominy grits, etc., made into a porridge and well cooked. (3) A soft-boiled or poached egg with bread broken into it and a glass of milk.

Second Meal (10 A.M.).—A glass of milk.

Dinner (1.30 to 2 P.M.).—(1) Bread moistened with dish-gravy (no fat), beef tea, or beef juice; a glass of milk. (2) Rice or grits moistened in the same way; a glass of milk. (3) A soft-boiled egg and stale bread thinly buttered; a glass of milk.

Rice, sago, or tapioca pudding, or junket, in small quantities, as a dessert with any of these diets.

Fourth Meal (5 P.M.).—A glass of milk or some bread and milk.

Fifth Meal (9 to 10 P.M.).—A glass of milk.

DIET FROM EIGHTEEN MONTHS TO TWO YEARS.

Breakfast (7 A.M.)—(1) A glass of milk with a slice of bread and butter or a soda, Graham, oatmeal, or similar unsweetened biscuit. (2) A soft-boiled egg with bread and butter and a glass of milk. (3) Porridge as described in the previous list.

Second Meal (10 A.M.).—(1) Bread broken into milk. (2) Bread and butter or a soda or other biscuit with a glass of milk.

Dinner (2 P.M.).—(1) Boiled rice or a baked potato mashed and moistened with dish-gravy or beef juice; a glass of milk. (2) Mutton or chicken broth with barley or rice in it; some bread and butter, and some sago or rice pudding made with milk. (3) A small portion of minced fish, or white meat of chicken or turkey, or rare roast beef, beefsteak, lamb, or mutton; bread and butter; a glass of milk.

Fourth Meal (5 P.M.).—(1) Bread and milk. (2) Bread and butter and a glass of milk.

DIET FROM TWO TO THREE YEARS.

Breakfast (7 to 8 A.M.).—(1) A small portion of beefsteak, with oatmeal, hominy grits, wheaten grits, farina, corn meal, or other cereal porridge with plenty of milk. (2) A soft-boiled egg, bread and butter, and a glass of milk.

Second Meal (11 A.M.).—(1) A glass of milk with bread and butter or with a soda or other biscuit. (2) Bread and milk. (3) Chicken or mutton broth.

Dinner (2 P.M.).—Roasted fowl, mutton, or beef cut fine; mashed baked potato with butter or dish-gravy on it; bread and butter. As dessert, tapioca, sago, or rice pudding, junket, or a small quantity of raspberries, peaches, grapes without seeds, orange juice, or stewed apples or prunes.

SUPPER (6 P.M.).—(1) Bread and butter. (2) Milk with soda or similar biscuit or with bread and butter.

DIET AFTER THREE YEARS.

FOODS PERMITTED.

MEATS.—Broiled beefsteak, lamb chops, and chicken; broiled liver; roasted or boiled beef, mutton, lamb, chicken, and turkey; broiled or boiled fish; raw or stewed oysters.

EGGS.—Soft-boiled, poached, scrambled, omelet.

CEREALS.—Light and not too fresh wheaten and Graham bread, toast, zwieback; plain unsweetened biscuit, as oatmeal, Graham, soda, water, etc.; hominy grits, wheaten grits, corn meal, barley, rice, oatmeal, macaroni, etc.

SOUPS.—Plain soup and broth of nearly any kind.

VEGETABLES.—White potatoes, boiled onions, spinach, peas, asparagus except the hard parts, string and other beans, salsify, lettuce, stewed celery, young beets, arrowroot, tapioca, sago, etc.

FRUITS.—Nearly all if stewed and sweetened; of raw fruits, peaches are one of the best; pears, well-ripened and fresh raspberries, strawberries, blackberries, grapes without the skin and seeds, oranges.

DESSERTS.—Light puddings, as rice pudding without raisins, bread pudding, etc., plain custards, wine jelly, ice-cream.

FOODS TO BE TAKEN WITH CAUTION.

Kidney, muffins, hot rolls, sweet potatoes, baked beans, squash, turnips, parsnips, carrots, egg-plant, stewed tomatoes, green corn, cherries, plums, apples, huckleberries, gooseberries, currants.

FOODS TO BE AVOIDED.

Fried food of any kind; griddle-cakes; pork; highly-seasoned food; pastry; all heavy, doughy, or very sweet puddings; sausage; unripe, sour, or wilted fruit; bananas, pineapples, cucumbers, raw celery, raw tomatoes, cabbage, cauliflower, nuts, candies, preserved fruits, tea, coffee, alcoholic beverages.

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FOOD RECIPES.

BARLEY-WATER.

Two tablespoonfuls of washed pearl barley in one quart of water. Boil down to one pint.

EGG-WATER.

The white of one egg stirred slowly in one-half pint of cold water. Strain if necessary. Sweeten or not.

OATMEAL-WATER.

One tablespoonful of oatmeal in one pint of water. Let simmer an hour. Replace water as it evaporates. Strain.

ARROWROOT-WATER.

One teaspoonful of arrowroot in one pint of water. Boil five minutes.

RICE-WATER.

One heaping tablespoonful of washed rice in one quart of water. Boil down to one pint.

STARCH-WATER.

Three level teaspoonfuls of pulverized starch in one pint of water. Boil a moment until dissolved.

LIME-WATER.

A piece of unslaked lime the size of an egg in one gallon of water in an earthen vessel. Stir vigorously several times. Let settle. Pour out and replace the water. Keep covered. Use from the top. When the vessel is nearly empty refill with water, stir and let settle.

WHEY.

Two teaspoonfuls of liquid rennet in one-half pint of warm milk. After it stiffens, beat up with a fork. Strain.

BEEF JUICE, EXPRESSED.

Very slightly broil a piece of steak; cut into small pieces, and squeeze out the juice with a lemon-squeezer or meat-press. Skim off the fat when cold. Season with salt. Give cold or very slightly warm.

BEEF JUICE, COLD PROCESS.

One pound of minced steak, six ounces of water, a pinch of salt. Stand on ice overnight Strain through muslin by twisting very tightly.

PEPTONIZED MILK.

Procure from the druggist powders each of fifteen grains bicarbonate of sodium and five grains of extract of pancreas. Add.......... powder to each bottle of food. Place the bottle in water of about 115° F.,—*i.e.*, never so hot that the hand could not be held in it without discomfort. Keep the bottle here for.......... minutes, or a shorter time if the milk grows bitter before the baby finishes nursing.

BATHS.

SALT BATH.

Four heaping tablespoonfuls of salt to each gallon of water.

MUSTARD BATH.

From one-half to one moderately heaping tablespoonful of mustard to each gallon of water.

J. P. CROZER GRIFFITH.

Medicine

CLINICAL OBSERVATIONS ON CERTAIN DIATHETIC CONDITIONS.

BY SIR DYCE DUCKWORTH, M.D., LL.D.,

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THE doctrine of the diatheses is little, if at all, in vogue either in medical teaching or practice at the present time. It is commonly supposed to be of no value, and the details respecting it remain, for the most part, buried in old books, and are regarded as mediæval lucubrations of old physicians who groped in the dark days before microscopes and more precise clinical methods were introduced. To hold this view of the subject is almost equivalent to a belief that the physicians of the last part of the eighteenth and earlier part of the nineteenth century were mostly fools and little endowed with accurate powers of observation.

The question for us to-day is, were these worthy men right or wrong? Are their teachings, or any part of them, applicable now, in these early years of the twentieth century, or are we, after careful consideration of them, justified in letting them, with many other bits of old medical lore, as *artes perditæ*, drop into the limbo of the past? In medical, as in other, matters the wheel of time brings round again ideas and doctrines that have been propounded by those who preceded us on this world's stage, and thus we find that our own thoughts have been thought before, and that there often appears to be nothing new under the sun. With increasing experience, the sense and real inwardness of old ideas and doctrines sometimes strongly appeal to us, and show how our predecessors have been face to face with the same problems that are presented to us, and have thought them out with calmness and

such patience as we can seldom bring to bear on them in these more restless days. Certainly the wheel of time has not yet brought back again the ideas underlying the doctrine of the diatheses. In this essay I propose to anticipate the occurrence, and to enlist the attention which I regard as due to it.

I count myself happy to have been taught early in my professional career by a great master of the subject, the late Professor Laycock, of Edinburgh, who not only well knew the teaching of the older physicians in this matter, but added much to it from his own stores of observation, and brought his remarkable powers of mind to bear on it.[1] It can hardly be doubted that the doctrine of the diatheses was over-elaborated by some of those whom we must regard as authorities upon it, and the tendency to over-refinements, amounting in many cases to mere speculations and fancies, doubtless led many more sober-minded physicians to disregard not only these excrescences, but the whole doctrine itself. Certain it is, that for the last half-century few medical authors in any country, always excepting France, have ventured to refer to the matter, or to regard it as in any way materially affecting either the diagnosis or the treatment of disease. It appears to me now, after more than thirty years of experience in hospital and in other practice, almost an absurdity to put in a plea for the careful study of this matter, for I not only declare my belief in the absolute certainty of these doctrines, in respect of at least two habits of body, but I conceive it to be impossible to comprehend some of the problems which meet us in daily practice without a knowledge and recognition of these essential biological facts.

We are brought directly in face of this question at the present time, when the study of tuberculosis so widely engages attention from bacteriologists and physicians. One of the main factors relating to the incidence of this disease, the condition of the personal bodily predisposition, appears to me to be all but ignored and regarded as of no moment in the inquiry. I, therefore, ask, first, who are the subjects of tuberculosis? and, secondly, are all human beings equally liable to this parasitic invasion and its malign outcome? I will reply to the second question at once, and meet it with a direct negative. It is clearly the case that many

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[1] *Vide* Medical Observation and Research, Edinburgh, 1862.

individuals manifest resistance to tubercular infection. My reply to the first question is, that those individuals who offer little or no resistance to tuberculosis are persons whose bodily tissues are so constituted as to present a suitable and favoring soil for this noxious parasite. These two classes of persons are obviously of different conformation, since they react differently to the same invasive irritant when it alights upon them. If these be facts, as I confidently affirm they are, how infinitely important it becomes to recognize them, and to discover, if we can, wherein lies the specific difference in the two cases!

Bacteriologists are agreed that tuberculosis, as such, is practically due to a particular element or material, and is not conveyed from parent to offspring. If it is not communicable from parent to child, it is therefore not hereditary. The latest researches confirm the earlier ones on this point.[1] Yet, as we well know, the offspring of tuberculous parents too commonly fall victims to tuberculosis in one or other of its phases. Why is this?

Before replying to this pertinent question, I must, in all fairness to my argument, record that there are facts which prove that, although *very rarely,* bacilli of tubercle may be found in the tissues of the new-born animal. They have been met with in the case of the calf, and we have to suppose that the placenta has been the medium of infection in such an instance. I have only been able to find a few facts of this kind which have been observed in the human fœtus, or new-born child, and it is believed by all observers to be most infrequent, even in animals which are specially prone to tuberculosis.[2] Koch regards the degree of communicability through this channel to be of no practical moment whatever.

The old opinion that tubercular maladies were hereditary—that is, that the seeds of the disease were already implanted, as it were, in the intimate tissues of the newly born—can, therefore, no longer be held. Hence we are compelled to regard the malign influence, whatever it may be, as existing not in *direct infection,* but in the *textures* both of the parent, or parents, and the offspring, whose intimate tissues react badly, and offer little or no resistance

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[1] Koch, Address to the International Congress on Tuberculosis, London, July, 1901.

[2] A few such cases have been recorded. *Vide* my address on the "Personal Factor in Tuberculosis," Lancet, London, November 9, 1901, p. 1252.

to the bacilli of tubercle when they invade the body through any channel. To this condition and quality of bodily textures we apply the terms scrofulous or strumous, and these names reintroduce us to language now seldom met with in medical writings or teaching. The old idea of a scrofulous habit of body has been discarded to a large extent, and now we find pathologists bold enough to declare that a *scrofulous* state is a *tuberculous* state. This I absolutely deny. The terms are *not* synonymous. I hold that a scrofulous person is not a tuberculous subject till he is specifically infected by tubercle bacilli. It is, happily, possible to be strumous or scrofulous, throughout life, without ever becoming tuberculous, and herein lies, as I believe, a great fact in practical medicine which we shall do well to pay heed to. It is certainly a misfortune to possess by heredity a strumous habit of body, but, by special care and precautions, an individual thus diathetically impressed may entirely avoid tubercular infection, and so escape all the varied manifestations of it during his whole term of life. It is easier to avoid tuberculosis than to prevent the spread of strumous proclivities.[1]

The characters of the strumous diathesis have long been well defined, and they were better studied by our predecessors than they are by us to-day. The old physicians described two main types of this condition, somewhat facetiously termed the "ugly" and the "pretty" varieties. These we may readily find nowadays for ourselves. The liabilities and the specific qualities of each variety are practically the same. Persons of the strumous habit are especially vulnerable to irritants of all kinds and react badly to them. Their wounds heal slowly; any inflammatory process in them is apt to linger and leave sources of mischief behind it. The condition modifies many processes of other morbid states. The strumous patient is a bad subject for pneumonia, pleurisy, and enteric fever. In the tropics he is more than others liable to suffer from hepatic abscess. Injuries to joints and bones are slow to repair. The lymphatic system is especially sensitive, and glandular enlargements are thus readily induced. There is a lia-

[1] "He partook of the temperament [*i.e.*, the diathesis.—D.D.] of his mother, who had died of a consumption in early age."—Sir Walter Scott, "Heart of Midlothian," chapter ix. Reuben Butler, here referred to in fiction, lived on to a ripe age, and escaped the *ens in actu* of tuberculosis.

bility to prolonged suppuration, and therefore to lardaceous degeneration of various organs as a consequence of this. Strumous subjects rarely, and with difficulty, recover from parenchymatous nephritis. This is a sad list, yet it hardly exhausts the varied frailties entailed by this diathetic habit of constitution.

With respect to the condition of adenitis which is so often met with in these subjects, there is a difference of opinion as to the presence or absence of tubercle bacilli in the tissue involved. Some careful observers declare that these bacilli are not to be found, while others have met with a few. The same statements are made with regard to this matter in the case of lupus, which all recognize as an appanage of the strumous habit of body. It is probable that both classes of observers are right, but it is certain both as to adenitis and to lupus that the bacilli are few and hard to find. We are fully justified, however, in believing that many irritants other than tubercle bacilli are capable of inducing adenitis in scrofulous persons, and are not to declare for tuberculosis in all cases of adenitis which may occur in them. It is a common experience that this disorder is apt to decline, spontaneously, under treatment, or after suppuration, and leave the patient free from any tubercular manifestations for the rest of his life. The fact of such past adenitis is, however, a key-note of the constitutional diathetic habit of that particular person, and this habit never dies out, for it is part of his very nature, significant of the peculiarity and intimate quality of the tissues of his body.

It may fairly be urged that tuberculosis is not peculiar to persons of this diathesis, and I admit this objection. My argument is not that persons must be or become strumous before they can become tuberculous, but I maintain that no person of sound body and in robust health is likely to harbor, and encourage the growth of, the bacilli of tubercle. There must be present a condition of low textural vitality, even in those who come of a healthy stock, whereby their resistance to this invasion is weakened. This susceptibility may be but temporary, and, as we know, with renewed powers tuberculous processes may be arrested and prevented from spreading till a further depressed condition of health occurs, when the resistance is again lowered and fresh outbreaks take place. Our methods of treatment have long been based on knowledge of these facts.

It is sometimes declared that no disease is more often arrested than tuberculosis, and this statement is true, and is founded on the results of autopsies which afford indications of obsolete or inactive tubercles in some thirty or forty per cent. of all cases which come to the dead-house. But it is to be borne in mind that these figures are drawn from hospital practice, which everywhere deals with the poorest classes of humanity,—that is, with people who have more than others struggled against nature and been exposed to devitalizing influences. Moreover, these classes are composed of persons who from various circumstances are especially liable to specific tubercular infection. We may fairly believe that a much smaller percentage of obsolete tuberculosis would be found in the bodies of persons who enjoy a superior environment.

It is quite certain that many persons are completely immune from attack by tuberculosis. Were it possible to institute direct experiments upon these happy subjects, I believe that this immunity could be demonstrated.

Without entering upon the abstruse doctrines of heredity, and discussing whether the practical immunity from tuberculosis of the majority of people who live in what Sir Andrew Clark termed "physiological righteousness" is due merely to a survival of the fittest, we may fairly believe that the wide-spread invulnerability to tubercular disease is due to the possession of constitutions, or habits of body, which are so organized as to resist the inroads of the specific, irritant parasite. Tubercle bacilli will no more settle and thrive on a soundly constituted body than a pine-tree will grow to maturity on a chalky soil or roses flourish on a sandy one. If this be a fact, it certainly deserves recognition, and compels us, as physicians, to pay due heed to the family medical history and the textural peculiarities of our patients. Obviously, to fortify a constitution against a strumous habit is to prevent the onset of tuberculosis in it. A recognition of this diathetic proclivity warns us to avert from its possessor all possible chances of tubercular infection, and compels us to tend all forms of ailment in such persons with more than ordinary assiduity and circumspection.

I venture, then, to regard as proved the existence of a strumous habit of body, indicating a specific quality and tendency of tissue-organization in its possessor, whereby morbid processes in him follow a course different from that which is witnessed in persons

not so endowed and possessing none of the proclivities already indicated. This habit of body is widely spread and is probably to be met with in all parts of the world. It prevails more in some latitudes than in others. It is intensified by all agencies which lower the vitality of the body. We meet with varying degrees of it even in members of the same family, some individuals manifesting graver expressions of it and other lesser indications. It is to be noted further, as might be expected from the nature of the case, that a coalescence of this diathetic habit with other predispositions often occurs, one specific tendency blending with another and materially modifying the proclivity of the individual thus affected. As a result of this coalescence, which is due to heredity from different sides of a family in the ancestry, we meet occasionally with remarkable phases of disease on the supervention of morbid processes. Not to recognize such factors is to miss some of the most obvious clinical phenomena which we witness in daily practice, these being dependent on the varied reactions of the blended constitution in question.

I pass on next to discuss another diathetic condition. In many parts of the world rheumatism and gout are common disorders, and the same may be affirmed of the varieties of deforming arthritis. But not every one is rheumatic, gouty, or arthritic. Regarding all forms of *true* rheumatism, as, I believe, we are now entitled to do, as of an infective nature,—due, that is, to a specific and particulate microbe (a diplococcus),—we have to inquire why so many persons who must be freely exposed to the infection escape the malady. I am of opinion that only certain persons are prone to be so infected, and they are the subjects of that habit of body which is recognized in the French school as the arthritic diathesis. Bazin is believed to have first propounded this doctrine, which has long had the support of the greatest masters of our art in France and was completely adopted by Laycock. This diathesis is no more of universal prevalence than is the strumous habit of body. Like all such conditions, it is heritable, and it denotes a peculiarity of textural proclivity which provides a suitable soil for the reception and development of the rheumatic peccant matter. We find, therefore, a condition here analogous to that which we have noted in respect of the relation between the strumous habit and tuberculosis. The arthritic diathesis is a remarkable one. Charcot

regarded it as a basic condition from which two main branches extended, giving rise to a rheumatic and a gouty stock respectively. Persons of this habit are specially liable to suffer from all forms of rheumatism, and have an inherent tendency to develop gout. The immunity from such maladies which many persons possess, although equally exposed to one and the other, is probably to be explained by their sound and normal condition of body, which affords no *nidus* for the specific infection in the one case, and is void of the peculiar form of tissue metabolism which engenders the autotoxin of the other. I must here interpolate the remark that many disorders are regarded as rheumatic which own no such pathogeny. The term "rheumatism" is often but a synonyme for pains of many kinds. Many painful conditions attributed to rheumatism are often of a truly gouty nature. We must regard rheumatism not as consisting of arthritis and carditis alone, but as a disorder which may and often does alight upon other textures, —to wit, the skin, the throat, the muscles, and the brain. To any of these varieties the arthritic subject is exposed, and some of them may appear in his offspring and possibly be unrecognized as manifestations of rheumatism. I believe that many cases of congenital heart-disease are due to rheumatic endocarditis in the fœtus, through maternal influence.[1]

The arthritic diathesis is to be regarded as a habit of body which is especially vulnerable to such peccant matters as generate rheumatism, gout, and some other ailments, and prone to react specifically more or less severely in respect of the component structures of joints. Many persons are thus texturally impressed, and their tissues present a soil in which the irritant toxins just indicated flourish readily and provoke their respective manifestations.

The two diathetic conditions which I have described are in some measure antagonistic, as I shall try to show; yet we meet with a blend or coalescence of them in many instances, the one modifying the other. In any case the strumous element is a harmful one. We have seen that under its influence diseases alighting on its possessor are apt to be rebellious and lingering. A strumous

[1] The heritable quality of gout which is transmitted by persons of the arthritic habit is not, as is sometimes taught, uric acid, but a tendency to mal-assimilate certain articles of diet, and a peculiarly modified tissue metabolism.

subject is a bad one for all acquired disorders. We note not seldom a history of tubercular disease in the relatives of patients suffering from osteo-arthritis, and in many of these the strumous element badly modifies the course and the degree of intensity of the malady.

It is comparatively rare for gout to occur in persons of a strumous habit, and there is a greater antagonism here than in most cases. The more strumous the less gouty; the more gouty the less strumous. This fact is well manifested in the life-history of the children of the gouty, who rarely show any signs of struma; and, again, we see indications of it in the behavior of any tuberculous process which occurs, although rarely, in the gouty. Tuberculosis in the gouty is almost always chronic and slow in progress, and the lesions tend to heal readily. Gouty arthritis is apt to be lingering and accompanied by more effusion if there be a strumous element in the patient.

We thus derive a hint in regard to the treatment of scrofulous subjects, and may confidently feed them upon a full animal diet, with wine, in a gout-provoking manner,—so to say,—to their great benefit. We occasionally meet with cases of senile scrofula at a time when some of these patients have lived long enough, and well enough, to grow gouty, and such persons may attain to great age in comparative comfort. The gouty element has been a saving one for them.

We meet with some of the worst forms of syphilis in strumous subjects, and the lesions of the former malady assume modified aspects in gouty subjects. The latter are singularly vulnerable to the poison of gonorrhœa, and afford the worst examples of so-called gonorrhœal rheumatism and iritis.

We may not be able to follow the older physicians in their accounts of some other diathetic states. It is probable that those of them who were less practical as clinicians, and more given to theories and to their pens, elaborated out of their inner consciousness various diatheses which we cannot now fairly recognize or yield assent to. It is not improbable, however, that there are other conditions of tissue-proclivity which have not yet been differentiated.

To apply the doctrines relating to these states of body, it is always important to bear in mind that they may be, and often are, modified by blending of constitutions, by repeated inheritance,

and to recognize that any one of them may be intensified by the reinforcement of the like. We shall never be able to assort matrimonial alliances on absolutely sound principles in respect of diathetic tendencies, but, as physicians, we should do well to make efforts in this direction. The result of promiscuous diathetic alliances is that we rarely find a family without a history of struma or arthritic tendency in some of its ancestors or collaterals. But we have not far to seek for instances affording proof of the reality of the specific tendencies that I have indicated, and not seldom we meet with examples which illustrate them only too perfectly.

I have tried to show that the diathetic states discussed have an important bearing on our diagnosis and treatment of certain diseases. I believe that the doctrines relating to them cannot safely be discarded and left out of account in practical medicine. They explain many of the puzzles and peculiarities which come before us.

Lastly, I will add that the views herein set forth are the results of my own personal experience, and that I have derived much benefit from their application in daily practice. It will be observed that they in no way contradict, but afford valid support to, the latest teachings of modern medicine, including bacteriology and animal chemistry; therefore, I humbly pay my highest tribute of praise to the skill and acumen of our wise and learned predecessors in the science and art of medicine, who did their part so well in the days when research was greatly beset with difficulties. May we, in our day, be no less wise and sagacious than they!

PROGNOSIS IN CHRONIC VALVULAR DISEASE OF THE HEART.

AN ADDRESS DELIVERED BEFORE THE NORTH LONDON MEDICO-CHIRURGICAL SOCIETY.

BY J. MITCHELL BRUCE, M.A., M.D., LL.D., F.R.C.P., Lond.,

Physician to Charing Cross Hospital, and Consulting Physician to the Hospital for Consumption and Diseases of the Chest, Brompton, London.

I WAS highly flattered by the request that I should deliver the opening address of the present session of the North London Medico-Chirurgical Society. At the same time I felt that I should best show my appreciation of the honor that you have done me if I were to submit something that might be of real service to you as busy practitioners burdened with responsibility. Therefore I have selected for my address the Prognosis of Chronic Valvular Disease of the Heart, a subject that gives us all daily concern and one on which I am convinced a good deal can be said with advantage.

But it is one thing to chose the subject of an address like the present; another thing altogether to treat it with success. How am I to communicate to you in the course of a short hour the considerations and conclusions on a matter of first-rate importance, which are the outcome of many years of experience and thought, and which guide me in my own work? The extensive and varied material of which an essay on prognosis in heart disease has to be constructed must be somewhat artificially arranged; and there is great risk that the result may be formal and dry, or, let us say, more adapted to instruct students than to satisfy a gathering of qualified men. Still, I felt that I must take this risk, and ask you to allow me to review the facts and arrange the conclusions to be drawn from them in a somewhat more systematic order than you do in your general practice.

Indeed, it will be well for us to consider in the first place, if but for a moment, the subject of prognosis in general. Prognosis is one of the great applications of the medical sciences, side by side with preventive, remedial, and palliative treatment; and it demands the exercise of as much intelligence, trained by means of study and

observation, as does Public Health or practical therapeutics. It is a common complaint that treatment is neglected as a subject of medical education. If this be just, what are we to say of instruction in prognosis! The student has mainly to learn it up from text-books on systematic medicine; but too often we find that in these prognosis is discussed in a manner which is not only useless practically, but even gives an erroneous notion of what prognosis truly is. We are told, for example, with respect to a certain acute disease, that the majority of cases may be expected to recover; of another, that the mortality is twenty per cent. Now, you will observe that these two statements, valuable as they may appear to be for prognostic purposes, are not only of no value for estimating the prognosis in the individual case when it comes before you, but strictly are not statements of prognosis at all. Both of them are accounts of the mortality of the respective diseases; statements of facts. But prognosis, or forecasting or prophecy, is not a statement of facts. Practical prognosis—*i.e.*, prognosis in individual cases—is an expression of opinion that a man will die, or will live, or will be permanently disabled, or will live the average term of life, or may marry with safety and advantage, or will never be fit to enter the army, or will benefit by retiring at once from work. Of course, like every opinion that is worth stating or accepting, prognosis in practical medicine is founded on facts; and what the student ought to be taught in theoretical medicine is which of the many facts he learns respecting each disease can be employed in estimating and framing a prognosis. Such parts of his knowledge as he can thus employ are called "the elements of prognosis." Experienced practitioners, like my present audience, have almost unconsciously sifted the facts respecting each of the more common diseases from this point of view so thoroughly for themselves, that they can tell with wonderful correctness what is going to happen. They say they can do so "from experience," by "common sense," by "the look of the case," they "hardly know how." Now this is empiricism in prognosis: valuable in the hands of the experienced practitioner, but useless to the student or young practitioner, because not available by him. Prognosis in pathology, like prognosis in meteorology or weather-forecasting, ought to be rational, that is, a practical application of scientifically determined facts. Of these there is now a vast number, and still a great and steady increase; and every por-

tion of this knowledge has some bearing, direct or indirect, constructive or destructive, on prognosis, just as it has on treatment. Is it not possible to analyze the settled facts of the different diseases, to collect from them the elements of prognosis, and to present them in a rational form?

Here, I confess, I feel I must apologize to you. As a teacher I find I have drifted into a didactic not to say dogmatic style, which ill-becomes me in addressing a meeting of men of my own age and experience. My answer to the charge which you may reasonably bring against me will consist in an attempt to show you how simple and how useful is the method of framing a prognosis on the lines which the previous considerations suggest.

The elements of prognosis in every disease are the facts in our possession with respect to its etiology, its pathological anatomy, and its clinical characters and course. In practice, as well as in theory, it is useful to keep these three orders as far as possible apart and to consider them separately. Perhaps I had better illustrate my meaning here by a reference to prognosis in an acute disease. Take a case of acute pneumonia—a peculiar instance of anxious practical prognosis. Is the patient going to live or to die? You give your opinion. From what facts have you formed it? What are the elements of your forecast? Let us see. The pulse, the respiration, the pulse-respiration ratio, the temperature, the nervous phenomena, delirium, typhoidal symptoms, clearness of mind and expression, the extent of lung involved, the invasion of one lung only or of two, the situation of the lesion, the stage of the lesion, the characters of the sputa, the state of the urine, the soundness of the heart; and as careful and experienced observers, you will certainly add two other bits of knowledge,—first, the patient's previous record of habits and life generally; secondly, the cause of the pneumonia, whether septic, typhoidal, influenzal, due to drain-poisoning, contagious or not. This is a long list of the elements of which the prognosis is constructed in pneumonia, yet you will allow that there is not one of them that you can afford to overlook. Now what I say is that these facts should be arranged in different orders when they are presented to the student, and reviewed in the same fashion when they are employed by the practitioner. First, there are the etiological facts. To this order belong the kind or type of the pneumonia, its cause, which of the recognized micro-organisms or toxines

is present, a point which unhappily is often easily settled on the second day by observing how the patient is already overwhelmed by the disease. And to the etiological order also belongs that prognostic element which you might well consider the most important of all—the man's record or previous history. Next we take the pathological facts—the extent, situation, distribution and stage of the pulmonary lesion, the state of the rest of the pulmonary tissues, and the condition of the other viscera, particularly the heart, arteries, and kidneys. Each individual fact under this head is of some service to you; each has its prognostic value which you may estimate, and which constitutes a "point" in your judging or judgment of the case, for recovery or against it. Lastly, there is the great order of purely clinical facts—such as are before you at the bedside—purely clinical phenomena and clinical course—the temperature, the rate and characters of the breathing, the pulse, the nervous symptoms, the presence of complications, the sputa; and the day of the illness, the features of its invasion, development, and progress, and the proximity of crisis.

Thus, it appears that in acute pneumonia, which I have used, as I proposed, solely as a useful because readily appreciable illustration, the many facts that are turned to account in framing a prognosis may be arranged in different orders, and arranged thus with great advantage. With a little trouble and thought and practice, we can fairly estimate the chances of recovery in every acute disease about which we have substantial knowledge.

If this method is useful in acute disease, how essential it must be in chronic disease, where prognosis relates to years, and involves the review and correct appraisement of a vast number of facts and considerations, complexly related to each other, particularly in chronic valvular disease, the course of which in great measure depends on the patient's own management of himself. With this conviction in our minds let us now turn to the proper subject of my address, and examine the different kinds of knowledge out of which we frame a prognosis of chronic valvular disease of the heart.

The rough-and-ready or routine prognosis is familiar: the patient is disabled for laborious, exciting or harassing occupations; his life is insecure and uninsurable; death may occur suddenly at an unexpected moment. This broad statement is variously elaborated and paraphrased in equally indefinite terms. Now, such a

prognosis was once all that could be offered to a patient or a patient's friends—in the days when etiology and pathological anatomy and clinical investigation were not so full and exact as they are now. How very different it is at the present time I shall try to show you.

The Etiological Elements of Prognosis.—1. When we have completed our investigation of a case of chronic valvular disease of the heart and proceed to frame the prognosis, the first question that we ought to put to ourselves is what prospect does the origin or nature of the disease afford us? A different prospect with each of the ordinary kinds of lesion. An old rheumatic lesion is a scar, and nothing more, a cicatrix which has distorted a valve or stenosed an orifice: this is an affair of the past, rarely progressive. This is a relatively safe condition, and the prognosis is correspondingly favorable. I remember as if it were but yesterday, although it is now twenty-seven years ago, the anxiety with which I attended a boy of fifteen, the son of one of my best friends, for acute rheumatic pericarditis and endocarditis of the aortic valves producing incompetence. That patient is still alive and active and promises to live the average term of life, although a proposal for insurance would not have been entertained by any company—at any rate in those days. A lesion of syphilitic origin is a different matter altogether: possibly recent, possibly active, associated with active disease of the coronary arteries and myocardium. This is a dangerous process, and the prognosis is highly unfavorable: life is relatively short and quite insecure; death may be sudden. It is remarkable how frequently syphilitic lesions, including syphilitic lesions of the heart, are found in the bodies of persons admitted dead into a London hospital. My own observation agrees with this. I have known a strong-looking man of forty with aortic incompetence, in whose case the existence of cardiac pain and a history of syphilis induced me to offer a fatal prognosis, die in a few days, much to the surprise of his medical attendant who was not prepared for so rapid a termination of the case. Is the valvular lesion atheromatous? Then, again, we have to forecast less favorably. Not but that many persons live for years with an aortic systolic murmur significant of an atheromatous arch, but that with this there often is associated atheroma of the coronary branches which may at any moment prove fatal, or more slowly lead to myocardial degeneration and failure of the heart. In the former event, sudden death is, sometimes at least, due to rapid

formation of a thrombus on a diseased area of a coronary artery, the result of some temporary depression of the circulation or alteration of the blood. And a similar event may occur, to our disappointment and distress, in these cases of long-standing atheroma just when we are congratulating ourselves that we have overcome the cardiac failure and removed the dropsy by means of judicious treatment. Or the cause of the valvular disease may have been acute strain or chronic strain, and these must be reckoned with as fairly as possible in forecasting the expectation of life and health, neither of which is by any means secure when the cusps or the chordæ tendineæ or other part of the valvular apparatus is either torn or worn.

Now let me ask you whether this element of prognosis in chronic valvular disease is sufficiently respected in routine practice? I fear it is not. Does our habitual diagnosis in such a case include a distinct conclusion as to the kind, that is, the nature or origin of the process which has damaged the valve? I doubt it. How many of us, having found a mitral systolic murmur, really trouble to ask ourselves how it originated. We satisfy ourselves in busy practice with the discovery of "valvular disease," just as we do with such an incomplete diagnosis as "pleurisy" or for that matter "sore throat"! And yet you will see that for our present purpose, as well as to guide us to rational treatment, this is an indispensable subject of inquiry. Its importance is recognized at once when the point is definitely stated. I repeat: never let us neglect this element of prognosis in cardiac disease. It is one of the keys to prognosis in every instance, and most strikingly to the future of fatty degeneration, and to sudden death in coronary disease otherwise.

2. The second order of prognostic elements is derived entirely from pathological anatomy. It includes the *seat* of the valvular lesion—whether aortic, mitral, tricuspid or pulmonic; the *form* of the lesion—whether obstructive or regurgitant, or both, at each of the orifices; and the *extent* or degree of the damage to the valvular apparatus. Further, it comprises the condition of the cardiac walls —whether hypertrophied, or dilated, or both, the nutritive condition of the myocardium and that of the vessels, as well as the state of the other viscera. All these anatomical facts can be learned by ordinary clinical examination—by a study of the symptoms and signs. They are the facts on which prognosis in heart disease as it is learned from the books is chiefly based. We are told that aortic lesions are less

favorable than mitral; that mitral stenosis is more unfavorable than mitral incompetence; that some lesions are so slight that they do not sensibly disorder the circulation; that tricuspid systolic murmur is ominous because usually a manifestation of cardiac failure, but may be expected to disappear if the failing heart respond to remedies. Now every word of this is correct—so correct that I need not dwell on it to-night; but how doubtful is its value standing by itself, that is, without that first order of considerations—the etiological, which we have just reviewed! Aortic incompetence, it is true, is a relatively unfavorable *form* of lesion; but it is chiefly unfavorable because it is so often degenerative or specific, and so seldom rheumatic in its *nature*. Therefore, whilst we give their due to the seat and form of the valvular disease, do not let us be led away by them, that is, by the attractive murmurs which reveal them to us, from what is less evident on the surface, but all important, the essential origin or kind of the pathological change.

3. The third series of facts which we employ as guides to prognosis in valvular disease of the heart is purely clinical—the phenomena of the functional condition of the circulation—of the adequacy or inadequacy of the heart and vessels as a great physiological system. First and broadly, is there compensation or failure: is the man free from what are called "the symptoms of heart disease," or does he suffer from precordial distress, palpitation, pain, dyspnœa, dropsy—the manifestations of an incompetent circulation? The two conditions are entirely different clinically; but we know that compensation may at any time pass into failure if the conditions of life, that is the influences under which the heart is nourished and is worked, become unfavorable. Therefore, if compensation is present and the question be whether it can be maintained, these influences must be understood as well as how far they can be controlled or anticipated. If the heart has failed, and we are asked for a prognosis, we must never fail to discover if we can which of the many possible influences is to blame, and to consider whether it be within our control. We find that something or other, as a rule quite independent of the lesion, is at work when the heart fails: something altogether new has occurred to break compensation; in connection with the patient's occupation, his food and other ingesta, including stimulus, the nervous influences of every kind around him, the different diseases, acute and chronic, to which he is exposed,

particularly such as involve the circulation, the strains of growth and development, and of special functional activity, as in women, and the advent and progress of old age.

Let us consider in the first place how this all-important factor in the progress or history of a case of valvular disease is to be correctly reckoned with in the prognosis of a case of compensated disease of the heart? Whether the lesion be rheumatic or be syphilitic, whether it be aortic or mitral, whether it be obstructive or incompetent, the future of it, and with its future the correct prognosis of it, hang after all very much upon the conditions of life in which the patient lives and in which he may be expected to live. If our forecast is to be correct we must know these: first, what every subject of valvular disease may anticipate, and secondly, what the particular individual before us may anticipate. Now you may say that this is a personal question only—a question relating to each individual case as it comes before us. If the patient be a poor overworked intemperate man, compensation will speedily fail; if he be a healthy, well-off and well-living youth, he may live for fifty years. This is true; but can we not differentiate more particularly the common causes of cardiac failure in a way which may be of immediate service to us in practical prognosis? I believe that we can, and I propose to search for them and to submit them to you in the connection which I regard as of greatest practical value to you: namely, as they occur and are to be anticipated, at each of the principal periods of life.

First, suppose we are asked for our opinion of the prospect of life and health in a lad of fourteen to nineteen who is the subject of valvular disease of the heart with compensation. Having estimated the etiological and pathological elements of the prognosis, as I have recommended (let us say having given due weight to the facts that the disease in this instance was caused by rheumatic endocarditis and consists in mitral incompetence), we ask ourselves what circumstances or conditions of life influence compensation for good or for ill in such a patient, and will continue to influence it for some years. We have no difficulty in answering this question. In the first place rheumatism is a standing danger. Unless care be taken, this boy may at any time have a return of rheumatism in acute or subacute form, or perhaps more likely nothing more disturbing to his people than sore throat, or growing pains, or erythema, or pleurisy, with a

little feverishness—but unfortunately with fresh endocarditis or pericarditis, the development of a fresh valvular lesion and failure of the heart. Or, if he be pushed and worried at school, he may become choreic—again with fresh inflammation of his heart. Other acute diseases, anæmia, impoverishment by improper feeding (whether insufficient or excessive), hardship and bad management generally are also common causes of broken compensation in childhood. Of course we must never forget physical exertion in the keen and active school-boy, whose principal thought is of cricket, football, and cycling. A week ago I was consulted by a young gentleman of nineteen, about to go up to Cambridge, on the subject of the exercise that he might safely take during the winter term. Seven years ago he had acute rheumatism with mitral endocarditis, characterized by a systolic murmur at the apex. He made an excellent recovery; and, indeed, in the course of eighteen months the murmur disappeared. But two years ago an unfortunate event happened. After a football match he was seized with palpitation, which lasted for two hours. Ever since, palpitation has returned as often as he exerts himself, by running or boxing, and therewith a pricking pain under the left breast; whilst hot rooms bring on a feeling of precordial oppression and inability to take a deep breath. I found the heart enlarged on both sides, that is, dilatation with hypertrophy of both ventricles. There was no murmur, as the patient's doctor had told me, and therefore, strictly speaking, the case was not one of actual valvular disease with failure of compensation under physical stress. But it was even more instructive than that in connection with our present subject. It was an instance of *repaired* valvular disease in which the muscular walls were strained by physical exertion. The practical bearing of these prognostic considerations is obvious, as well as the importance of regarding every case of heart disease in a youth from this point of view. The parents dwell so anxiously upon the heart and the effects on it of exercise or exertion as to be oblivious to everything else. Our chief concern as practitioners is centred in the prevention of rheumatism which is lying in wait for him, and may haunt him throughout all these years; and our advice is mainly directed to the prevention of rheumatism and to the immediate and thorough treatment of it should it appear in any of its forms or phases however mild. Here, let me say by way of parenthesis, we

appreciate one of the principal uses of correct prognosis, of prognosis practised on rational lines. I have called it an expression of opinion, a prophecy, but it is a forecast which, like a weather-forecast or a storm-warning, carries with it a patent suggestion of measures for prevention. In the youth with a valvular lesion of rheumatic origin, prognostic knowledge, if correctly employed, means successful prevention by control of the diet, by attention to the stomach and bowels, by close and continuous outlook for the appearance of any one of those aberrant phenomena or phases of rheumatism which I have just mentioned, as well as for the occasional facial twitching or nocturnal restlessness, which so often foreshadows an outbreak of chorea and acute inflammation of the heart.

During adult life, extending from twenty-one to forty-five, the prognosis of compensated valvular disease has to take into account an entirely new or additional series of influences which threaten to lead to failure. The danger of rheumatism, though ever present, has in great measure passed, and with it that of over-pressure at school and chorea. In young men exercise is still very likely to be abused, with strain as the result. The most important causes of new kinds that have to be foreseen and reckoned with are the work, business or profession which the man has taken up as the occupation of his life, with their many unfavorable actions on the circulation and nervous system, not to speak of other functions; the abuse of alcohol and tobacco; and syphilis. In women with valvular disease at this time of life the serious risks connected with maternity in its different phases have to be definitely estimated in making a forecast. And in both sexes it goes without saying that between twenty-one and forty-five the course and promise of the patient's life, whether fortunate or unfortunate, comfortable or hard, as well as the patient's disposition and character, are practically settled; and that the prognosis is to be modified accordingly. How different is the immediate and prospective forecast in mitral disease during this period of life from what it was in childhood and adolescence! How different the elements of the problem presented to us! How wide the survey that must be made by the practitioner who is responsible for advice as to the future—as to the occupation most suitable for a young man with aortic incompetence, the wisdom of marriage in the young woman with mitral stenosis; the limits that ought to be set in every case to work and responsibility undertaken and increased

with every year of life, as well as to the enjoyment of pleasure, rest, and self-indulgence. Prognosis here demands the exercise of close observation and much thought; and happily it is peculiarly assisted by that intimate acquaintance with the individual patient in all his relations which the family practitioner possesses so fully as compared with the consultant.

We next arrive at that period of all periods of life which concerns us most anxiously as the advisers of the subject of valvular disease, namely, middle-age and early senescence—from forty-five to sixty. The outstanding influence of an unfavorable character with which we have now to reckon in the prognosis of compensated valvular disease is degeneration, which for our present purpose we may regard as characterized pathologically by that complex condition called atheroma. Nutrition fails in the arteries—not only throughout the vascular system generally, with serious backward effect on the walls of the heart, but particularly in the coronaries themselves, whereupon the valves which they nourish break down and the myocardium is impoverished, weakened, and diseased. Now atheroma, as I attempted to show in the Lettsomian Lectures before the Medical Society last March, can usually be traced to some familiar cause if one will but take the trouble to do so—gout, glycosuria, and allied disorders of metabolism, including corpulence, alcoholism, Bright's disease, syphilis, or it may be to nervous strain, or to physical strain during attempts to recover health and vigor by muscular exercises. Degeneration is not a natural or necessary result or manifestation of old age, unless aging is to be defined as the result simply of wear-and-tear and nothing else. Here, then, there is plenty of scope for judgment in prognosis in older or aged subjects of valvular disease, and if prognosis be prompt and successful perhaps for timely prevention. Whilst we speak of vascular and cardiac degeneration and atheroma as the common result of all the causes and processes that I have just named, the pathological processes themselves are by no means identical any more than are the causes. Some of them are essentially progressive, I grant you, and therefore hopeless, such as Bright's disease; but others are amenable to treatment and therefore less unfavorable prognostically, such as simple strain and the outcome of injudicious indulgence in food and rest; in these the importance of timely provision is obvious. The danger of the advent of gout after thirty in the subjects of

chronic valvular disease with family predisposition suggests the timely adoption of well-recognized measures for prevention. In a word, correct prognosis at this period of life, as at others, demands intelligent observation and consideration of the special dangers ahead. I know of no class of cases in which opinion and advice as to the future can be offered with less confidence than in senile heart disease, unless the problem be attentively surveyed from this point of view, for individual symptoms and signs, such as pain, faintness, palpitation, increased precordial impulse, weak apex-beat, and murmurs, to which we are accustomed to attach so much prognostic importance—angina, for example—are more or less common to all the kinds of it, and therefore most difficult to employ as elements of prognosis.

Let me turn now from the compensated to the failing heart in valvular disease, and inquire how we can turn to prognostic use the clinical facts that characterize it. Our efforts to maintain compensation have been in vain. As we stand by the bedside of a child, a young man, a middle-aged or an old man, suffering from dropsy, orthopnœa, precordial distress, and the other miseries unhappily so familiar to us in valvular disease with failure, is it not too late to inquire which of the many causes of failure that we have reviewed is at work before us, and from it to estimate the prospect of recovery? It is not too late; and I maintain that a correct prognosis is impossible otherwise. Is it rheumatism, or chorea, or physical strain in the lad of seventeen that has changed the healthy-looking youngster of a month ago into this poor sufferer? The question must be deliberately asked and if possible answered. Is it worry, or drink, or exertion, that has broken down cardiac compensation in the same way in this man of thirty-five? Is it the responsibility and worry of a great business, or the consequent success and self-indulgence ending in disordered metabolism and gout or even Bright's disease, that is at the bottom of the urgent cardiac symptoms in the city merchant, who has had an attack of angina in hurrying to business in the morning, although to our knowledge he had had a cardiac murmur without symptoms for the last twenty years? The correctness of our answer to the anxious inquiries put to us by him and his friends will depend in great part on the trouble we take to ask these questions and to answer them faithfully.

But I must stop. You will begin to say by this time that prog-

nosis in chronic valvular disease of the heart involves nothing short of universal knowledge. Indeed, this is very near the truth. In chronic cardiac disease, more than in any other disease, there is seen that balance of disease and repair, of disability and compensation, which exists and must be maintained in every damaged individual and every damaged organ if health is to be preserved, and which must be restored if health have been disturbed; and this balance is dependent on every condition and event of life. It is not from a knowledge of etiology and pathology alone that the practitioner is in a position to prognose, but also, and far more in most instances, by that knowledge of man individually and of the world that distinguishes the family practitioner.

SOME INTERESTING CARDIAC LESIONS, WITH AUTOPSIES.

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A REPORT OF THE LARGEST RECORDED ANEURISM OF THE HEART, WITH SPECIMEN.

Cardiac aneurisms, although in themselves of little clinical importance, are on account of their rarity always interesting, and for that reason it is my desire to report the following case. I believe it to be unique, a careful search through medical literature having failed to reveal any instance in which the aneurismal sac reached the tremendous proportions of this one.

Two years before the patient came under my charge, he was admitted to the Philadelphia Hospital with general dropsical symptoms. He was under my observation for two years. During this time, and one year before his death, Dr. Pepper decided that he had a left pleural effusion, and, introducing an aspirating-needle, drew off two hundred and thirty-five cubic centimetres of pure blood, which rapidly coagulated. The case was reported by Dr. Pepper as one of hæmothorax. No unpleasant symptoms followed the operation.

When the patient came under my care the whole of the left anterior chest, nearly to the axilla and clavicle, was pulsating and heaving with each beat of the heart. To the left of the sternum, at the junction of the fourth and fifth ribs, there was a circumscribed, more markedly pulsating area. He had attacks of dyspnœa on slight exertion, or when under excitement, for two years before his death, associated with a cyanosed condition of the skin, particularly about the face. He was also dyspnœic when the atmosphere was heavy.

About two months before death, the anasarca, which had disappeared two years before, returned, with increased dyspnœa. During the last two years of his life, his radial arteries had undergone rapid

degenerative changes, so that at the time of his death these vessels were like a string of beads, from their atheromatous condition. During the last few months that he lived he became weaker and weaker, and death was looked for two days before it occurred. He died rather suddenly, apparently from apnœa. At the time of death his face was greatly swollen.

Physical Examination.—On inspection, a slow, outward wave towards the left was observed, which went far out beyond the left nipple, and high up near the left clavicle. Palpation showed that this heaving, wavy impulse extended as far out as the midaxillary line, and at times beyond it. On percussion, the left side of the chest was found to be flat over its entire surface.

Auscultation showed an absence of all breath- or voice-sounds. On applying the ear to the chest to the left of the sternum at the fifth interspace, a long, rather soft, systolic murmur was heard, followed by a long, soft, whiffy sound, which corresponded in time with the diastole of the heart. The two sounds together occupied nearly the whole cardiac cycle.

Autopsy.—The following notes were taken at the time when the post-mortem examination was made.

"The *left lung* was compressed to about one-third of the size of an ordinary fist, and pushed above the position of the root of the lung, where its apex should have been. The *right lung* was slightly compressed, as the heart encroached upon the right cavity of the chest. Here and there were emphysematous patches. The pleural cavities contained no effusions or adhesions, and were healthy.

"The *heart* itself was hypertrophied, particularly the left ventricle. The aortic valves were slightly thickened and stiff. The mitral valve and the pulmonary valves were healthy.

"Springing from the left ventricle was a very large aneurismal sac, which was in close contact with the left side of the chest. The pericardium was thickened, and quite intimately adherent to the heart and the aneurismal sac, but they could be separated by the occasional use of the knife. The mediastinal pleuræ were everywhere incorporated with the pericardium. Near the base of the heart the pleura contained soft, yellow lymph, evidently the result of a recent inflammation. The aneurismal sac formed the apex of the mass; its walls were about three millimetres thick, and were composed of a dense, light, fibrous material, appearing to the naked

eye to be made up of widely separated muscle-fibres, demonstrable after the pericardium was removed.

"When the sac was opened, it was found to contain a large amount of blood. In its lower part, and half-way up its sides, it was coated with laminated clots, about two centimetres in thickness. After the removal of the black, clotted blood, the cavity was filled with water. Upon weighing, its weight was found to be two thousand eight hundred and fifty grammes. On emptying the sac and reweighing it, the weight was found to be thirteen hundred and seventy grammes less. As a cubic centimetre of water weighs a gramme, it will be seen that the cavity had a capacity of thirteen hundred and seventy cubic centimetres, or nearly a litre and a half. Two holes, communicating with the left ventricle, were discovered. They were about the size of a large quill. The apertures were about a centimetre and a quarter apart, and seemed to be located in a white substance, which was undergoing atheromatous change. The inside of the sac was here and there covered with plates of atheroma. In some places calcareous degeneration had taken place. Spicules of this material appeared in the incision, and at one place in the left side of the sac a hard plate gave forth a sharp click when struck with a knife.

"The *liver* was contracted, indurated, and congested. Its edges were contracted and rounded. To the right of the transverse fissure was a white spot, depressed, and looking like a cicatrix, probably an old infarction. The *spleen* was small, blue, and firm. The *kidneys* were congested, slightly contracted, and a little granular. The capsule was quite firmly adherent. There was no erosion of the vertebræ."

Realizing that the above notes, made many years ago, did not adequately describe the minute points of interest in this specimen, I asked Dr. David Riesman for a more systematic description of it, and he has most kindly furnished me with the following dictation.

"*May* 26, 1901.—The specimen before us is that of a heart which has been kept in alcohol for nineteen years. The organ is very much enlarged towards the left side, on account of hypertrophy of the left ventricular wall and the pressure of a large aneurismal sac springing from the left ventricle.

"The *chamber of the left ventricle* is about normal in size, but

its wall is greatly thickened; in the preserved specimen it measures more than two and a half centimetres in thickness. The *columnæ carneæ* are well marked and the papillary muscles very thick and strong. The mitral valve, in its anterior leaflet, presents a small sclerotic patch; it is, however, perfectly pliable. The posterior leaflet is normal. The *tricuspid orifice* admits three fingers. The *aortic valve* presents nothing abnormal, except that on one leaflet, at its insertion into the aorta, there is a small, elevated ridge of atheroma on the ventricular surface. The *aorta* is of normal calibre, and has, scattered through it, a few calcified plates. The *coronary openings* are patulous, although one is rather small.

"In a somewhat funnel-shaped recess, situated between the two sets of papillary muscles of the posterior mitral leaflets, are two oval openings connecting the aneurism with the ventricular cavity. One opening has its long axis transversely, and measures about one centimetre in length, and three millimetres in width; the second is of about the same dimensions as the first. The margins of both openings are smooth, and have a glistening, fibroid appearance. This is particularly true of the inner opening. On the ventricular surface these openings are separated by a bridge of tissue, six millimetres wide and one centimetre long. On the aneurismal surface the openings are large, somewhat funnel-shaped, and surrounded by fibrous tissue, slightly puckered. The outer opening is undermined, and communicates with the ventricle by a third perforation, opening about eight millimetres to the outer side of the median line, in a recess formed between the corresponding papillary muscles belonging to the anterior and posterior mitral leaflets. This opening on the ventricular surface is oval, with its long diameter vertical to the wall of the ventricle, and measures one centimetre by three millimetres. There are thus three openings on the ventricular surface and two on the aneurismal. They are all situated about three and three-fourths centimetres from the auriculoventricular ring.

"The aneurism itself is the size of a child's head, and springs from a point almost opposite the ventricular septum. It has thick, tough, fibrous walls, that can be separated into at least three layers. When not covered by clot, the internal surface is quite smooth and glistening. There are thick, laminated clots at the bottom of the sac, around its attachment to the ventricle, particularly at a point corresponding with the apex of the ventricle. The sac has been incised by

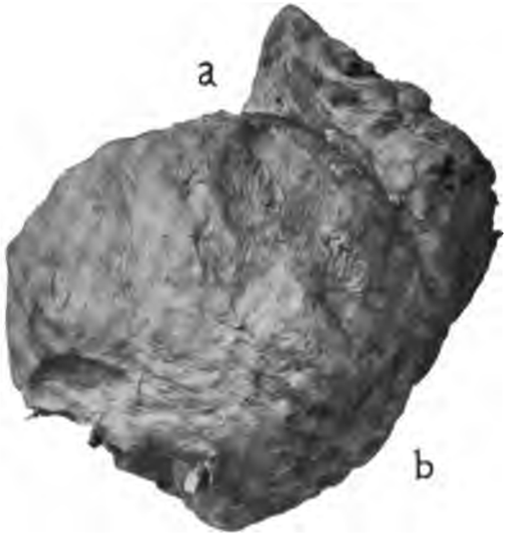

Fig. 1.—Posterior view of heart showing aneurismal sac distended. The line *a b* shows the boundary between left and right ventricles.

Fig. 2.—Aneurismal sac laid open. Floor of sac formed by left ventricular wall two and a half centimetres thick. Capacity of sac, thirteen hundred and seventy cubic centimetres; length fifteen centimetres; breadth, thirteen and three-quarters centimetres; depth, sixteen and one-quarter centimetres. (Both illustrations are much reduced in size.)

a long, vertical cut, and shows no point of rupture. There are some signs of old adhesions on the external surface, especially at the base of the attachment of the sac to the wall of the heart. At its base the sac measures fifteen centimetres vertically, and thirteen and three-quarters centimetres transversely, while from the ventricular wall externally to the inner wall of the sac the distance is sixteen and a quarter centimetres. To the outside of the openings is a crescentic, projecting ridge, forming a niche about two and a half centimetres deep, and five centimetres high. This ridge is continued below as a low elevation, for a distance of five centimetres, to a point two and a half centimetres below the openings.

"The *chamber of the right ventricle* is not enlarged. The wall is slightly thick, and measures about one centimetre in diameter. The *right auricle* presents nothing abnormal. The *pulmonary* and *tricuspid valves* are normal. The *foramen ovale* is closed. The *left auricle* is normal.

"As the heart is now, it having been somewhat flattened in the jar, it would appear that the apex was in a large degree constituted by aneurism."

There are three points of interest in this case:

(1) So far as I am able to learn, it is the largest aneurism of the heart that has ever been recorded.

(2) The patient lived for years, not only with greatly diminished breathing capacity, but also with a severe complicating cardiac condition.

(3) The removal of two hundred and thirty-five cubic centimetres of blood, to accomplish which must have caused a break in the continuity of the aneurismal walls, failed to produce any symptoms whatever.

A CASE OF INTERVENTRICULAR ANEURISM OPENING INTO THE RIGHT VENTRICLE BY ULCERATIVE PROCESS, AND ANEURISM OF THE ABDOMINAL AORTA, WITH AUTOPSY.

History. January 9, 1885.—"Matthew D., aged fifty-three years; single; white; born in Ireland; came to America when three years old.

Family History.—"Mother and father died of old age. Has had three brothers and one sister. One brother died of typhoid fever, one was shot during the War of the Rebellion, and the third died of an unknown cause. The sister is alive and well.

Past Medical History.—"Has used whiskey and beer to excess, and tobacco moderately, all his life. Has always had fairly good health. Had measles when a child, and chills and fever six years ago. Has never had rheumatism.

"In 1865 he had a primary sore, which made its appearance about nine days after exposure, and was followed by no secondary symptoms. Five years ago he had a severe fall from a horse. He first noticed palpitation of the heart and shortness of breath three years ago, but considered himself perfectly well, except for some precordial pain, until March, 1884. At that time he was seized with an attack in which he became very faint, fell down unconscious, and remained so for several minutes. On attempting to get up, some three hours later, he found himself still very weak. He did not have another attack until March, 1885. This attack lasted about an hour, with a period of unconsciousness of probably ten minutes. At this time he vomited, but on no occasion did he expectorate any blood.

"Since the date just mentioned, he had a number of attacks, which seemed to be becoming more frequent, although they were apparently not more severe than at first.

Physical Examination.—"The precordia is prominent and bulging. There is a very apparent area of pulsation, five centimetres in diameter, in the third interspace, between the mammary line and the left border of the sternum. The apex beat is visible within the nipple line, and extends over an area which would correspond to a circle with a diameter of three and three-fourths centimetres.

"Over the pulsating region, as above given, is heard a systolic murmur, most intense over and above the second costal cartilage, at a point midway between the nipple-line and the left border of the sternum. Palpation shows there is also present a marked thrill.

"The murmur is transmitted over the entire precordia and into the great vessels of the neck. It is also heard in the left interscapular and axillary spaces and at the angle of the scapula on the same side. Over its seat of maximum intensity this murmur can be heard with the ear removed from the chest.

"The patient also complains of a sharp pain shooting through to the back, which, from the murmur also present here, probably has its origin in the abdominal aorta."

Note, November 20, 1885.—" The patient is now suffering from one of his attacks. He feels faint, and his whole body vibrates with each systole of the heart. The pulse is 136, gaseous, small, and feeble. He states that at the beginning and close of his attacks his eyesight fails and his eyeballs become more prominent."

Note, December 3, 1885.—" Posteriorly the point where the murmur is heard with greatest intensity is on the left side, opposite to and five centimetres to the left of the second dorsal vertebra. It is transmitted five centimetres farther to the left, gradually growing fainter, but being still audible at the point of the shoulder. Anteriorly the murmur is most intense in the second intercostal space, two and a half centimetres to the left of the sternum, where it may be heard with the ear five centimetres from the chest.

" Associated with this murmur there is an area of dulness, over which may be felt a thrill, extending from two and a half centimetres below the clavicle to the lower border of the third rib, and from the right edge of the sternum to a point just in front of the anterior border of the left axilla. With the palm of the hand placed upon this area, the left arm extended, and used as a stethoscope, the murmur may be heard by another placing his ear at the left elbow-joint."

Autopsy, March 26, 1886.[1]—" Left thorax prominent up to the upper border of the second rib, extending over the entire heart region. Pericardial sac bulging. Precordial space full, and entirely uncovered by lung. Thoracic aorta slightly dilated; there is a small, saccular dilatation above its origin anteriorly, capable of admitting a small chestnut. Inner surface roughened, with some calcified plates on the arch.

" *Heart.*—Left auricle much dilated; mitral orifice dilated, admitting more than three fingers. Valves slightly thickened. On opening the right ventricle, an aneurism of the undefended portion of the interventricular septum is found bulging into the right ventricle, into which it opens through a small orifice, probably the result of an old ulceration. This aneurism is large enough to contain a good-sized walnut. The right auricle is also dilated.

" The liver and kidneys show considerable passive congestion.

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[1] All notes made at autopsy and not directly bearing upon the physical signs are omitted.

"The abdominal aorta is much thinned at its commencement, and throughout its entire length is the seat of extensive atheromatous changes. Extending from the diaphragm to the iliac arteries is a fusiform aneurism filled with old coagula, its lumen being occupied by recent clots. There is no erosion of the vertebræ."

A CASE OF ANÆMIC NECROSIS IN THE WALLS OF THE LEFT VENTRICLE, WITH ANGINA PECTORIS AND LOCOMOTOR ATAXIA.

The case is that of a practising physician, aged fifty-four, who was working hard in a country practice. Fifteen or twenty years ago Dr. D. Hayes Agnew said that a sore on his index-finger was undoubtedly a chancre. No positive evidences of secondary or tertiary syphilis were observed. He had had mild symptoms of angina pectoris for three or four years, which gradually grew worse, until in October, 1899, he could scarcely walk, owing to the intense suffering. He had lightning and girdle pains, and was unable to walk in the dark, and in the daylight it was necessary for him to keep his eyes upon the ground.

At the time that I examined him with Dr. Stokes, there was no abnormal pulsation of the heart; no bruit, thrill, or murmur. Both pleural cavities contained fluid. Dr. Stokes reported to me that soon after I saw the patient he grew much worse. He had oppression and increased dyspnœa, a violent form of Cheyne-Stokes respiration set in, the lungs became congested, and the legs were paralyzed. After great suffering, he died about two weeks later.

The autopsy showed effusion in both pleural cavities and recent adhesions on the right side. There was hepatization of the middle lobe of the right lung and part of the lower lobe of the left, with effusion and recent adhesions in the pericardium. The inner surface of the pericardium was quite rough. The heart was large, weighing four hundred and sixty-eight grammes, with soft, flabby muscular walls. An organized clot was found in the right auricle. The coronary arteries were extremely rigid and under the scalpel grated like plaster. In the distribution of the anterior coronary artery, near the apex, a cavity of *anæmic necrosis* was found, holding about fifteen cubic centimetres of a chocolate-colored, semi-fluid substance.

The specimen illustrates how an aneurism could result by the rupture of such a cavity into the ventricle; or should both walls

give way, causing a communication between the ventricle and the pericardial sac, a complete rupture of the heart would naturally be the result.

A CASE OF SPONTANEOUS RUPTURE OF THE HEART.

I desire to report this specimen as it illustrates a condition that might be produced by a weakening of the ventricular walls by disease, such as is shown in the case of myomalacia of the left ventricle, which I have just reported to you. The specimen was presented to me by Dr. J. S. Baer, of Camden, N. J. He obtained it from a married woman, aged sixty-five, who was under his care. Her *family history* contained no points bearing upon the case.

Previous History.—She had typhoid fever some thirty years ago; otherwise she had always been well, except for periodic attacks of severe pain in the hepatic region.

Present Condition.—When first seen the woman was up and attending to her domestic duties. She was moderately jaundiced, with a temperature of 102° F., and complained of severe pain and soreness in the region of the liver. The doctor ordered her to bed at once, and placed her upon appropriate treatment. In about a week she was free from pain and the jaundice was much less. Having had no fever for several days, she was considered convalescent. Contrary to instructions, however, she arose, walked about the house, and sat before an open window for some time. It was cold November weather. The next morning the doctor was sent for, and found her somewhat cyanosed, with rapid respiration and pulse, severe pain in the left axillary region, and slight cough. These symptoms continued for five days, when he was again sent for in haste, and found the woman in a state of collapse, with no radial pulse. A faint heart-beat could be heard over the left breast. The face was pinched, cold, and deeply cyanosed. There had been no nausea, vomiting, or straining, but dyspnœa was very marked. The patient was very restless and delirious, and complained of feeling smothered. The above symptoms of collapse came on suddenly while the patient was in bed; in spite of their severity, she lived for more than twenty-four hours before death occurred.

Autopsy.—In the gall-bladder were found one hundred and twenty-five small stones nearly equal in size. Both pleural cavities contained large quantities of serous fluid. Hepatization of the

lower lobe of the left lung was present. The vessels of the pericardium were injected. There was a good deal of dark, fluid blood in the pericardial sac. The left ventricle was found to be ruptured to the extent of from two and a half to three and three-fourths centimetres. This rent was closed by a dark blood-clot.

In the history of this case we notice several interesting and unusual points.

(1) The woman was rather young for an accident of this character. When we discuss the causes, it will be seen why a more advanced age than this would render the occurrence more likely.

(2) Apparently she was asleep when the rupture occurred.

(3) Over twenty-four hours elapsed between the time when the rupture presumably took place and the time of death. There is, I believe, a case recorded in which the symptoms came on eleven days before death, but that case is cited in all the books as being very remarkable. This patient lived so long probably because the rupture was small, and also because she was in a quiescent state; only a small quantity of blood was, therefore, allowed to escape slowly, and clot formation was thereby induced.

The rupture is now only about two centimetres long on the outside, and inside it is still smaller, but large enough to admit the end of my finger; the shrinkage is probably due to the action of the preserving fluid used. The rent is situated on the posterior aspect of the outer wall of the left ventricle, which, as statistics show, is the position in which it most often occurs. In Barth's series of twenty-four cases every one occurred in the left ventricle. Meyer's table of thirty-six cases—all recorded since 1870—shows that twenty-five were of the left ventricle, seven of the right ventricle, and four of the right auricle.

Rupture of the heart is, as must be readily appreciated, a rare condition; yet Dr. Wadsworth tells me that in his work as coroner's physician he once saw three cases in six months. He admitted, however, that the records of the coroner's office would not show the accident to be so common, and that he had seen no other cases since he had been serving in his present capacity.

Rupture of the heart is most commonly due to fibroid and fatty degeneration, which cause the muscle fibres to become tender, so that they may at any time give way under strain. Another not uncommon cause is occlusion of the coronary arteries, cutting off the

blood-supply and interfering with the nutrition of the myocardium. In this way, too, the tissues are weakened, and rupture may be easily produced. Small abscesses occurring in the muscular structure may act in the same way.

It is exceedingly rare that rupture of the heart occurs in one who is not exercising or straining. Generally a person engaged in some usual or unusual muscular effort suddenly falls and immediately dies; but, as we have seen, the rupture may occur some days before death takes place. In such cases, a positive diagnosis cannot be made, for without an autopsy it is not justifiable to say that the symptoms, which might be produced by other well-known conditions, are in a given case caused by rupture.

Dr. Newton, of Montclair, reports a specimen taken from the body of a boy about twelve years of age. This boy, while riding on his bicycle, met another wheelman coming from the opposite direction. They made two or three attempts to avoid each other, but finally collided; not, however, sufficiently hard to knock either rider from his wheel, and there was no rebounding. The boy dismounted, stood up for a moment, and then dropped dead. In the middle of the ventricle was found a small aperture, as if a small piece had been torn up. There was no ulceration, fatty degeneration, or thickening of the wall; and that the boy should have been killed by such an insignificant blow seems very strange. In the average college foot-ball match every participant has more force applied to his chest than this boy had, yet such an accident has never been known to occur on the foot-ball field. The most reasonable supposition is that the active exercise of bicycle-riding had caused his heart to beat very fast, and that the handle-bar of his wheel struck his chest over the heart while the latter was in diastole.

Gamgee's figures on twenty-eight cases, in twenty-two of which the exact location of the lesion is specified, show that the right ventricle was ruptured in eight, the left in three, the left auricle in seven, and the right in four. Packard has reported a traumatic case which involved both auricles and the interauricular septum. From these figures it appears that the left ventricle is the least liable to be affected in traumatic cases, while in spontaneous cases that ventricle is almost invariably the one in which the rupture occurs.

WINGED INSECTS AND THEIR LARVÆ AS PARASITES OF MAN.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POLYCLINIC HOSPITAL AND SCHOOL FOR GRADUATES IN MEDICINE.

BY JAMES J. WALSH, M.D., Ph.D.,
Instructor in General Medicine at the Polyclinic.

GENTLEMEN,—Most of our text-books on medicine contain chapters on the worm parasites of human beings, but there is seldom any mention of the fly parasites. Parasitology has received its due share of attention only in this last quarter of a century, but it promises to be of considerable practical importance. Only in very recent years, for instance, have we learned that such parasites as the *Anchylostomum duodenale* may, even in our own country, be the cause of serious persistent, progressive, and even fatal anæmia, which may be mistaken, as it so often has been in European countries, for genuine progressive pernicious anæmia. The practical value of the attention now paid to helminthiasis (this being the pretentious Greek-derived name that is applied to symptoms in the human being caused by the presence of worms of various kinds) will doubtless lead to more careful recognition of myiasis,—that is, the set of symptoms due to the presence of fly parasites.

CANTHARIASIS—TENEBRIO OBSCURUS.

My attention was first seriously called to the subject of larval parasites of the human being by a case that came under my observation last winter. A female patient brought me, carefully preserved in alcohol in a small vial, a worm that she said she had found on herself in her bath-room. She was sure that the worm had emerged from her anus. She was all the more worried about it because about a year ago she had found a peculiar worm on the floor of her bath-room, which in her nervousness she thought might have come from her. She had simply killed the preceding worm, but this one she had preserved in order to obtain a medical opinion with regard to it. The two worms were not at all alike, but this

only made her anxiety greater, for she was convinced that she must be a nursery for several kinds of worms.

From her description of the worm which she had first seen, I concluded that it might have been an ordinary "thousand-legger," so called, the familiar centipede that is quite common in our houses here in the North. This is a harmless worm, which is thought to be beneficent rather than harmful, for it is said to destroy a number of insect pests, such as roaches, that are the bane of the household.

The specimen that she brought with her seemed to be the larva of one of the forms of beetle. Beetles are not at all uncommon here in New York City, and the only surprise with regard to the worm was its presence during the winter months. I at once assured the patient that the worm could not have come from her, because it was not the descendant of a worm, but of a beetle. The beetle lays its eggs in some suitable material, and these develop into the beetle form after passing through a secondary worm stage. The explanation that the worm was really the larval form of a beetle did not reassure my patient very much. It almost seemed that she would have preferred to have had a genuine worm of undoubted worm genealogy than something that had any relationship to the horrid black beetles which she knew and detested so much.

Even with my scientific explanation, she could not be persuaded that the worm had not come from her. So I sent the specimen to the Division of Entomology of the Department of Agriculture at Washington, hoping to be able to present her an authoritative denial of her supposition that this kind of worm could ever be a parasite of the human being. To my surprise, the expert of the Department did not confirm my views in the matter, though he agreed with me as to the nature of the parasite. He said, "The insect which you send is one of the common meal-worms and is the larva of *Tenebrio obscurus*. It is possible that your patient passed the specimen, since such cases are on record. These larvæ have been found in the nose, stomach, bladder, and intestines of human beings."

The entomologist of the Division, Mr. L. O. Howard, referred me to an article in the Transactions of the Entomological Society of London on "Insects occasionally found in the Human Body." As I was unable to obtain the volume mentioned here in New York, it was very kindly forwarded to me from the library at Washington, and I found the article, by the Rev. F. W. Hope, who was at the

time president of the London Entomological Society, an extremely interesting and practical one. Mr. Hope collected cases of winged parasites of all kinds that had been found in human bodies and reviews the subject very thoroughly. He suggests certain distinctions in naming the diseases due to parasites according to the class of insects to which they belong. In general it would seem that the parasites do not occur with sufficient frequency to deserve the rather cumbrous nomenclature that would result from his suggestions. The scientific names thus suggested have, however, to some extent crept into medical literature, and I think that you should know them.

The term *scoleciasis* has been used for the diseases occasioned by the larvæ of insects generally. The Greek word *scolex,* meaning a worm, has become somewhat familiar to us of late years, because the suggestion has been made from more than one source that, the word *appendicitis* being a barbarous combination of Latin root and Greek termination, a better term for the familiar disease would be *scolecoiditis.* This is the Greek term for inflammation of the worm-like process of the intestines.

Altogether there are three orders of winged insects which have been found to cause symptoms in human beings. Mr. Hope suggests, then, that the term *canthariasis* be adopted for the set of symptoms which originate from the presence of coleopterous larvæ, that is, from the worm stage of the beetles. *Myiasis,* which has been adopted by some writers as a general name for all symptoms due to winged parasites, means properly the fly disease,—that is, symptoms due to the ordinary house-fly and its relatives. This name seems to be the one best suited for the symptoms which originate from the presence of dipterous larvæ. *Scoleciasis* more properly belongs to the symptoms arising from lepidopterous larvæ. The *Lepidoptera* constitute the class of insects to which ordinary butterflies and moths belong. Their larvæ are familiarly known as caterpillars, and, strange as it may seem, cases have been reported in which living caterpillars have been vomited from the human stomach, and even a few cases in which they have been passed from the human rectum.

The specimen that we have here is the larval stage of a beetle, and so, if we wished to be very exact, we would say that our patient had suffered from canthariasis. The beetle (Fig. 1) is com-

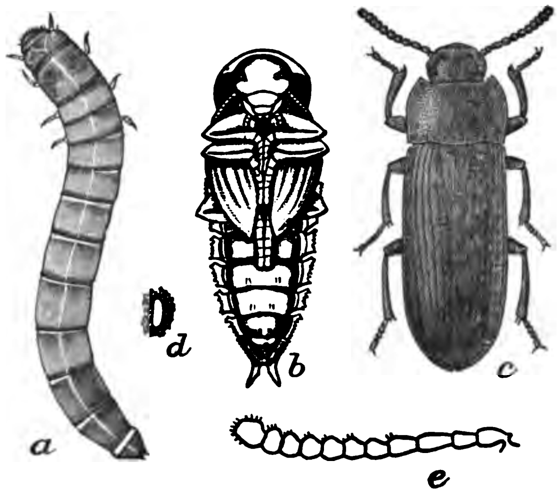
mon in our households, especially around fireplaces, and finds its way readily to bread-stuffs. It lays its eggs in cold victuals that consist mainly of starch.

When the larvæ develop they are ravenous eaters. Their favorite food is some one of the forms of grain, and so these worms sometimes cause a good deal of damage in mills, granaries, elevators, and meal storehouses. There is another worm, resembling this one completely except in color, that is the larva of a second species of beetle, *Tenebrio molitor*. (Fig. 2.) Here you may see the different

FIG. 1.

Tenebrio obscurus: male—somewhat enlarged. *a*, antenna enlarged still more. (U. S. Department of Agriculture.)

FIG. 2.



Tenebrio molitor: *a*, larva; *b*, pupa; *c*, female beetle; *d*, egg, with surrounding case; *e*, antenna—*a*, *b*, *c*, *d*, about twice natural size; *e*, more enlarged. (U. S. Department of Agriculture Bulletin, No. 45.)

stages of the insect's existence. It is a very familiar pest in grain-producing regions. The beetles themselves are, however, common in almost every part of the country.

According to the cases reported by Mr. Hope and those that are found in the literature of the subject, these larvæ have been found in the stomach as well as escaping from the rectum. When present in the stomach, they seem to have gained entrance as ova deposited in cold, starchy victuals that were insufficiently chewed, although when thus introduced we would naturally expect the eggs to be digested before reaching the worm stage. In dilated stom-

achs, however, especially in anæmic individuals whose digestive juices are very much deteriorated, the ova seem to find favorable conditions for development. After a time their presence produces acute gastric disturbance that brings on vomiting and the living worms are found in the vomited material. At least twenty such cases are reported in medical literature. There would probably be no question of the adult worms ever reaching the farther stage of their existence and becoming beetles. As we shall see, the larvæ of certain of the *Diptera* do develop even to the winged stage in the human body.

Now as to the source of the worm in our patient. She was suffering from rather painful hemorrhoids. The discomfort during stool was considerable, and so she was directed to use a remedy which I often find of great service in these cases. Each morning on rising she was to insert into the rectum a suppository composed of wheat gluten mixed with cacao-butter. In the presence of moisture the glutinous portion of wheat becomes mucilaginous, and so facilitates the passage of fecal material over the irritated portion of the rectum.

It would seem, then, that the suppository formed the medium by which the ovum of the beetle was introduced into the digestive tract. Either the beetle actually laid its eggs in the fully formed suppository (a not impossible supposition) or the egg was laid in the gluten before its manufacture into suppositories. The head of the Bureau of Entomology suggests that the larva may have been developed to a considerable extent before the introduction of the suppository into the rectum. In any case the use of the suppository seems to furnish the best explanation of the presence of the worm. As these suppositories are very commonly used, it is probable that other such cases have occurred and will continue to appear occasionally, to the surprise of patients and physicians.

The treatment of this form of parasitism is very simple in a case like the present, where the larva causes no symptoms except the nervous discomfort which follows its discovery. It is hard to understand the passage of the living larva through the intestines of a human being, but this seems to have happened in several instances, and the treatment, where one of the insects had made its appearance and there was no explanation for its presence in the rectum by introduction from without, would be the use of a brisk

purge. This would be especially indicated if, as in some of the reported cases, the passage of the worms through the intestines was accompanied by slight colicky pain.

These worms much more frequently produce symptoms in the stomach than in the intestines. At times a number of worms have been vomited, and where a specimen of this kind is found in the vomit it would seem advisable to give an emetic for the purpose of removing others that may remain. The continued existence of the worms in the stomach is, of course, impossible. Successive generations of these worms do not occur therein, and the pupa and beetle stages of development must be reached in order to have continued reproduction go on. As a rule, patients are more scared than hurt by the presence of the worm, and should be assured that it cannot possibly be a permanent inhabitant of the digestive tract.

The mere fact that a specimen of parasite brought by a patient is entirely unfamiliar and there is no mention of it in the textbooks is not sufficient to justify your doubting the patient's story at once. Of course there are certain symptoms and delusions in this matter that have been a source of not a little mystification in the past. Hysterical patients may declare that they have had parasites come from them, or may even claim to feel the parasites within them, when the only reason for their declarations is a morbid desire for notoriety. All sorts of small living things were formerly supposed to be able to live in the human body. The medical literature of a century ago contains reports of a number of cases of live frogs and snakes, and even one of a live mouse, ejected from the human stomach.

With regard to living snakes in the human stomach there is a popular tradition that it seems impossible to eradicate, though I have not been able to find a single case in which a regular physician seriously considered their existence therein possible. This must not, however, tempt you to reject such histories without due consideration. The stories of patients, even when they are evidently lacking in foundation, may still contain suggestive elements that will help the diagnosis.

The subject of peculiar parasites reminds me of a very instructive case met with at one of our larger medical schools. The patient, a man of about fifty, was firmly persuaded that many

years before, while bending over to drink at a spring in the woods, he had swallowed a small snake. Peculiar feelings in his stomach told him that the reptile was still alive and was crawling around in his stomach, giving rise occasionally to vomiting, occasionally to painful indigestion, and sometimes to sensations of movement within him that he described very vividly.

You are all familiar with these stories of snake swallowing. None of them are authentic. The tradition, however, of the possibility of such an accident remains as a commonplace for folklore stories. This patient did not notice that he swallowed the snake at the time of stooping over the spring, but came to the conclusion of having done so years afterwards when his peculiar intragastric symptoms developed. It is probably impossible for a reptile to live for any length of time in the human stomach. No amount of persuasion, however, would convince this patient of that fact, and his imperative idea continued to be the bane of his existence.

He was a man of only moderate intelligence, and it was thought that his delusion of the presence of a snake in his stomach might perhaps be overcome by an apparently successful attempt at its removal. Accordingly his stomach was washed out a number of times, and finally he was told that the introduction of a larger tube and some dark-colored fluid that would surely kill the snake would be followed by the exit of the reptile from the tube. A small dead snake was procured for the purpose and placed in a glass jar containing some very dark-colored liquid that made it invisible. The gastric lavage was proceeded with, and on the removal of some of the dark-colored liquid from the stomach it was allowed to run into this jar; the liquid was then poured off and the patient was shown the small green meadow-snake that had been obtained for the occasion. Needless to say, he rejoiced very much over the removal of the reptile, and for a week none of his old symptoms returned. At the end of that time he could no longer persuade himself of the entire absence of gastric discomfort, but he felt that some allowance must be made for the injuries to the stomach wall occasioned by the presence of the reptile for so long; therefore, he waited patiently for these to be healed. At the end of a month most of his old symptoms had returned with all their former severity. He then confided to the physician in charge his opinion of the cause of the continuance of the symptoms. He felt

sure, he said, that during the time of its stay in his stomach the snake had given birth to young ones, and that these were the cause of the persistence of his symptoms.

His was evidently a hopeless case. Nothing further was done to relieve either his mind or his stomach, and for some time he passed from observation. About two years afterwards he appeared at the charity hospital, very much emaciated and almost entirely unable to retain food on his stomach. After some weeks of ineffective treatment he died. The autopsy revealed a papillomatous tumor springing from the stomach wall. It was of myofibromatous character and had evidently been growing for a long time. It had a number of finger-like projections, and the rubbing of these processes over the gastric mucous membrane had evidently given rise during peristalsis to the sensations which the patient translated to mean the presence of a reptile in his stomach. The symptoms, if rightly appreciated, might have given some hint of the real condition that existed. That is the reason for telling the story; if the mere failure to overcome the delusion by deception had been the end of the case, it would be scarcely worth while recalling the circumstances, though they have a certain human interest.

THE LARVÆ OF FLIES AS PARASITES.

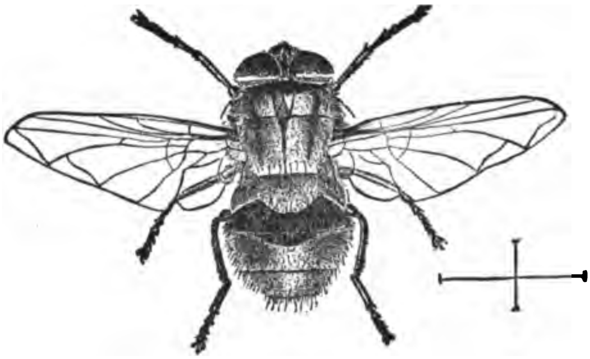
Harmless as they may seem, insects that closely resemble ordinary flies may produce by their larvæ serious and sometimes even fatal symptoms. The most interesting and important member of the group from a pathological stand-point is the screw-worm fly, *Compsomyia macellaria,* Fab., of the botanists. The United States Department of Agriculture says that, while the literature of the subject deals largely with its attacks upon man, because of its very general fatality when it gains an entrance to the openings of the face, by far the greater number of its attacks are upon the lower animals.

Professor Snow reported in 1883 a case that occurred in Southeastern Kansas. He had received specimens which proved to be so-called screw-worms, and it was learned that upward of one hundred full-grown maggots of this species escaped from the nose of the patient, who finally recovered from a serious illness consequent upon their ravages. This patient had been afflicted by ozæna accompanied by a copious offensive nasal secretion, the presence of

which had evidently made his nostrils an attractive place for the deposition of the ova of the flies. In this case, as in most others that have been reported, the patient had slept for some time in the woods during the daytime a few days before the first appearance of the symptoms produced by the larvæ.

Practically all the reported cases in which the screw-worm has acted as a parasite have resembled this one. The favorite place for oviposition by the flies is in some putrid material. This seems to be the reason why they are attracted to individuals who are already suffering and have suffered for some years from offensive nasal discharges. The fly may deposit its eggs not only on mucous membranes, but also in open wounds, especially if these have been

FIG. 3.



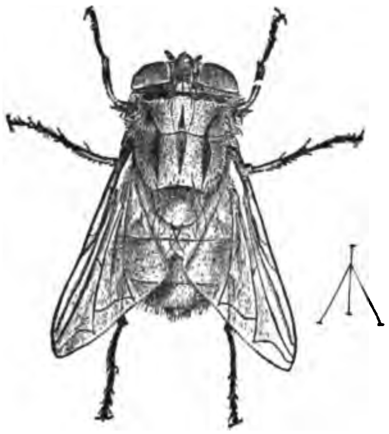
Compsomyia macellaria (the screw-worm fly): adult, wings expanded—enlarged (the crossed lines show actual size). (After Francis.) (U. S. Department of Agriculture Bulletin, No. 5.)

neglected and are unclean, or in old fetid sores. Needless to say, the maggots produce very serious ravages when this happens.

The Division of Entomology of the United States Department of Agriculture thus describes the fly whose larvæ, under the name of screw-worms, cause these serious ravages in the nasal chambers and in open fetid wounds. It is a small species, less than half an inch (ten millimetres) in length, of a bluish-green color with metallic reflections. (Fig. 3.) It may be distinguished from related forms by three longitudinaal black stripes on its thorax. (Fig. 4.) Its head is reddish or yellow; its body is covered with stiff black hairs. (Fig. 5.) The fly appears in early summer (during June or July in Texas), the time doubtless depending on the latitude being free from extreme cold or on the insects'

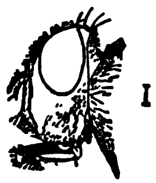
having a protected location in houses. There is no impossibility of the migration of these flies from localities several hundred miles

FIG. 4.



Compsomyia macellaria (the screw-worm fly): adult, wings at rest—enlarged (lines show actual size). (After Francis.)

FIG. 5.



C. macellaria: head, side view—enlarged (line shows actual length). (After Francis.)

south of the place of their appearance in early summer, as, aside from their powers of flight, they might be transported on boats or cars. I know of no observations, however, that prove such a means of distribution.

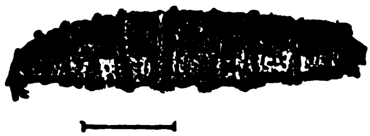
FIG. 6.

Egg mass of *C. macellaria*—enlarged. (After Francis.)

FIG. 7.

Egg of *C. macellaria*—greatly enlarged (line shows actual length). (After Francis.)

FIG. 8.



Larva of *C. macellaria*—enlarged (line shows actual length). (After Francis.)

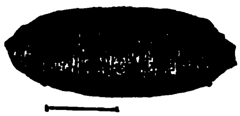
The fly selects some wound or decaying matter, in which it lays a mass of eggs at once. (Fig. 6.) At least three or four hundred may be deposited by a single female within the space of

a few moments, and the same fly may oviposit, at different times and in different places, hundreds or even thousands of eggs. These are cylindrical, like those of other flies, about one millimetre in length, and white. "Under the microscope the eggs show a prominent ridge on one side." (Weed.) (Fig. 7.)

The eggs hatch within a few hours. Francis says, "My present opinion is that, if the eggs are laid in a moist place and on a warm day, it requires less than one hour; whereas, if laid in a dry place, they seem to dry up and lose their vitality." Weed considers the time for hatching to be about nine hours.

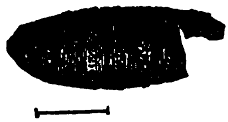
The larva, or maggot, is a whitish footless grub, rather slender and quite active, which burrows into the tissues of the affected animal or into the mass of putrid flesh or decaying matter that furnishes its food. (Fig. 8.) It grows rapidly and matures in five or six days (Weed) or about a week (Francis). When mature

FIG. 9.



Puparium of *C. macellaria*—enlarged (line shows actual length). (After Francis.)

FIG. 10.



Puparium of *C. macellaria*, showing broken end where fly has emerged—enlarged (line shows actual length). (After Francis.)

the larvæ escape from the wound which they have infested or wriggle away from the mass of matter in which they have developed, and bury themselves in the ground to transform.

The pupæ are brown, cylindrical, rounded at the ends, and about two-fifths of an inch in length. (Figs. 9 and 10.) The length of time passed in the pupal stage appears to vary, but observers agree that from nine to twelve days is the usual time; Francis gives nine for the shortest and fourteen for the longest period observed by him.

From this history it is evident that there may be a succession of many generations during a season, which for different individuals so overlap and combine that there are hosts of the insects in all stages, from their appearance in the early part of the season until checked by return of cold weather. As Francis says, "While the larvæ are thus developing, the flies are constantly laying fresh eggs in the wounds, so that the young worms take the places of

the matured ones, and thus keep up a constant and progressive loss of tissue."

As the eggs which produce the screw-worms are deposited mainly in the nostrils, it would seem comparatively easy to assure prevention of the resulting disease. The experience of a clergyman in Kansas, however, shows that this problem of prophylaxis is not as simple as it appears. The clergyman, while riding in his buggy in Texas, noticed this fly, the parent of the screw-worm, buzzing about him. It flew up into one of his nostrils and he blew it out; it then dashed up the other nostril and, without his knowing it, deposited a number of its eggs before he was able to expel it. He knew something of the nature of the fly, and yet did not for a moment think that there could be any danger from its presence for a few seconds in his nares. About three days later his nose became painful and swollen and its mucous membrane exquisitely tender. The pain became so great that he hastened to Austin, many miles away, to consult a physician. The inside of his mouth became sore and his soft palate was almost destroyed before the larvæ, over two hundred in number, were all expelled.

As a rule, the fly finds its way into the noses of persons sleeping in the open air, and especially of those suffering from offensive nasal discharges. Where patients are suffering from such a condition, then, it is important, if the fly is known to exist in the neighborhood, that their sleeping-rooms should be properly protected by mosquito netting. If such persons sleep under the trees, a not uncommon practice in the afternoon in southern countries, they should be warned to arrange some protection over their faces.

The case above mentioned shows how important it is that medical aid should be sought as soon as possible. A prompt syringing of the nasal passages with dilute carbolic acid (one part of acid to two hundred parts of water) is recommended to dislodge the eggs or to kill the worms. The physician will find the most effective treatment to be a thorough cleansing of the nares under the best illumination possible. Every part of the nose must be carefully examined and all suspicious appearances thoroughly investigated.

The favorite point of attack by the larvæ is the succulent tissue on the floor of the nostril immediately above the soft palate. As the worms set up acute irritation and inflammation, the field of view in this part of the nose, owing to the readiness with which the

erectile tissue reacts to irritants, soon becomes dark red, which makes it difficult to see the parasites; only the greatest care then will enable the physician to be sure of having removed them all.

The Division of Entomology of the United States Department of Agriculture gives some recommendations for the general abatement of the screw-worm pest wherever it exists. Serious as are the ills inflicted on man by this parasite, it is a still greater evil to dumb beasts, as these are unable to protect themselves. Practically all the domestic animals are liable to its attacks. The horse, the cow, the mule, the hog, the dog, and the cat, all suffer severely; hence the necessity for the limitation of the pest is very obvious. The most important prophylactic measure is the destruction of all dead carcases and other filth. This will rapidly reduce the number of flies in any given neighborhood, because they soon die off for want of their usual nutrition.

The special prophylaxis of animals requires the prevention as far as possible of bruises, cuts, and barbed-wire scratches and the prompt and careful treatment of such wounds when they occur. Burrows made by ticks, however, are perhaps the most common points of attack in animals, these punctures are usually somewhat fetid and the fly has a chance to lay its eggs well within the tissues. Human beings also may be thus inoculated in the extremely rare cases in which the fly finds on exposed portions of the body such a burrow as a nest for its eggs.

In the old days, when the linseed-meal poultice was used much more commonly and for longer periods in the treatment of external injuries than at present, reports were sometimes made by patients or by unskilled attendants which seemed to indicate the presence of worms or maggots in such wounds. When a linseed poultice has been allowed to dry for some time, however, there often clings to the surface of an open sore cylindrical particles of the poultice material, which may, in imaginative and untrained eyes, seem to be worms. This often gave physicians serious concern for patients at a distance, but an examination of the wound showed the real condition to be much less alarming than had been supposed. Where a poultice has been used, movement of the simulant cylindroid is the only element in a report that need occasion any anxiety.

Some doubt exists as to the species of fly that produces the maggots which result from the deposition of ova in open wounds

in human beings. Professor Curtis, of the Texas Agricultural Experiment Station, however, is convinced that it is the screw-worm fly, *Compsomyia macellaria,* which lays the eggs. He mentions a cat that had its foot injured, presumably in fighting. Three days later the animal's foot was swollen and filled with screw-worms: over sixty were removed from its paw within six days. They were placed in a bottle with a little earth and covered by a wire screen. The worms putated and in twelve days about thirty flies came out, all being of this genus. During the few days that the maggots were in the cat's foot they destroyed nearly every particle of flesh and caused one of the phalangeal bones to come away entirely.

All sores which become infested with these worms should be washed with a three to five per cent. solution of carbolic acid in water; the United States entomological expert thinks that the value of this wash would be enhanced if a little glycerin were added. A final dressing of pine tar, or in deep sores a packing with oakum and a coating of tar, are recommended.

THE PULSE IN PNEUMONIA IN CHILDREN.

THE SUBSTANCE OF A CLINICAL LECTURE DELIVERED AT THE NEW TOWN DISPENSARY, EDINBURGH.

BY H. OLIPHANT NICHOLSON, M.D.,
Physician to the New Town Dispensary, Edinburgh.

GENTLEMEN,—The examination of the child's pulse in health and disease by means of the sphygmograph is a field of research as yet little cultivated by the physician. In such a disease as pneumonia instrumental investigation of the pulse will sometimes yield information of the utmost value as to the condition of the heart and circulation. I propose to bring before you some points, which I think are of considerable interest, bearing upon the all-important questions of prognosis and treatment.

The Pulse in Croupous Pneumonia.—We may commence with a brief consideration of the pulse in the croupous variety. In this

FIG. 1.

Pulse in croupous pneumonia. Child under one year of age. Shows relatively high tension.

the prognosis is generally very favorable; therefore the sphygmographic appearances of the pulse are not of such interest and importance as they are in the catarrhal form of the disease. Still there are one or two points to which I should like to direct your attention.

The pulse during croupous pneumonia in early infancy shows some characters which are not often observed in older children. I have already drawn attention to the interesting fact that high temperatures in infants under one year of age do not render the pulse dicrotic.[1] Therefore sphygmograms which are taken from babies suffering from acute croupous pneumonia indicate relatively high tension, and we must not infer from this that the state of the arte-

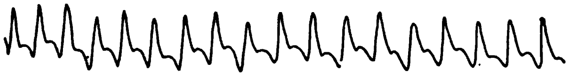
[1] Scottish Medical and Surgical Journal, May, 1901.

rial blood-pressure is satisfactory and that the child is doing well. (Fig. 1.)

From children over one year of age I have frequently obtained tracings which indicated high tension, and sometimes the pulse-curves were of the anacrotic type. So far as my experience goes, however, I may state that in young children sphygmograms taken at the onset of croupous pneumonia show high-tension characters over but a comparatively short period. In a day or two the percussion and predicrotic waves become blended together into a single summit, or the predicrotic wave is only poorly developed, while the dicrotic wave is well marked. This, then, is the type of pulse-curve at the height of the disease in moderately severe cases. Fig. 2 represents the kind of tracing often obtained.

The onset of acute croupous pneumonia in children does not seem to be characterized by a full, bounding pulse of high tension, as is often the case in young adults. I have made numerous obser-

FIG. 2.



Pulse in a case of moderately severe croupous pneumonia. Child aged three and a half years. Indicates fairly low tension.

vations on the state of the arterial blood-pressure in the pneumonias of children by means of the large Hill-Barnard sphygmometer. I have sometimes found it unusually high at the commencement of the disease in children over five years of age, but very soon the blood-pressure falls and tends to remain low.

In acute croupous pneumonia of the so-called sthenic type, in healthy young adults, I think it is not unlikely that the greatly increased arterial blood-pressure leads to an exudation of fibrin and corpuscles into the air-vesicles of the lung. Professor Hamilton, the distinguished pathologist, states that the lungs of young children who die from so-called acute croupous pneumonia do not present the same post-mortem features in this respect as the lungs of adults who die of the same disease. The relatively low blood-pressure in children during pneumonic attacks may partly explain why there is no throwing out of fibrin into the vesicles of the lungs.

One of the most striking facts about pneumonia of all kinds in children is the remarkable tendency of the blood-pressure to fall.

In *bronchopneumonia,* I am convinced, this is the main thing to guard against: to anticipate the, sometimes fatal, fall of blood-pressure is the chief object of our treatment.

In croupous pneumonia in children, according to Professor Hamilton, the lungs are pathologically different from those of croupous pneumonia in adults, and he used to teach that *all* the pneumonias of young children were really of the catarrhal type. *Clinically,* however, one can often distinguish a variety of pneu-

FIG. 3.

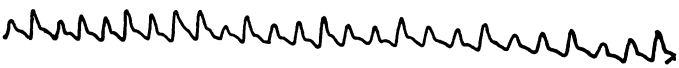
Pulse in croupous pneumonia in a favorable case. Child aged three and a half years. Shortly after the crisis.

monia in the child which may be properly called "croupous," and the prognosis is incomparably better than in the catarrhal form.

In croupous pneumonia the main thing to note is that in favorable cases the pulse-tension increases very shortly after the crisis occurs. The pulse then slows, and a type of irregularity is often observed similar to that which occurs in children when the heart is slowing down after any febrile attack. (Fig. 3.) This tracing may be compared with Fig. 2, as it was taken from the same child soon after the crisis had occurred.

In *unfavorable* cases the pulse-tracing indicates a falling blood-pressure and increased rapidity. The pulse-waves become of unequal size, and the dicrotic wave may disappear before death. Fig.

FIG. 4.



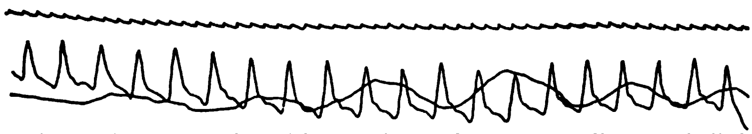
Pulse in croupous pneumonia in an unfavorable case. Child aged three years and three months.

4 shows the characters of the pulse in a child aged two years and three months, where the disease was going on to a fatal termination.

The Pulse in Bronchopneumonia.—Sometimes in infants under one year of age, suffering from this disease, a *dicrotic* pulse may be found when the temperature is high. In no other instance have I observed dicrotism in the febrile pulse of young babies, and the fact that it is found in bronchopneumonia supports the belief that the blood-pressure tends to fall unusually low in this disease. My

observations with the sphygmometer seem to show that the temporary initial rise of pressure sometimes noticed in cases of croupous pneumonia does not occur in bronchopneumonia. The pulse-curve —except in infants under a year of age—*invariably* indicates low tension, and more markedly so at the commencement than is observed in the croupous variety. Fig. 5 shows the kind of sphygmogram obtained in the early stages of a mild case of bronchopneumonia; a tracing of the respiration is also shown.

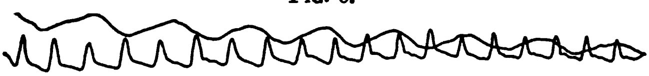
FIG. 5.



Pulse in bronchopneumonia in a mild case. Child aged five years. Indicates markedly low tension.

In cases which are going on to a favorable termination the tension of the pulse shows indications of increasing, the pulse also becomes slower, and a prolongation of the diastolic portions of some of the curves is often to be noted. But in those cases which progress steadily to a fatal issue there is a type of pulse-tracing to be obtained which I regard as highly characteristic. The pulse is exceedingly rapid—from 140 to 160—and the respirations are about 70 or 80 per minute. The pulse-waves are of various shapes and show varying degrees of tension, but the most important feature is the more or less complete disappearance of the dicrotic wave. A

FIG. 6.



Pulse and respiration in a case of fatal bronchopneumonia. Child aged one year and nine months. Temperature, 102.2°; pulse, 160; respiration, 80. (*Monocrotic* type.)

pulse which was perhaps fully dicrotic for many days, and suggestive of very low tension, loses this feature and becomes converted into a single wave,—in other words, becomes *monocrotic.* (Fig. 6.) This is a sure indication that the blood-pressure has fallen to a dangerously low point.

Fatal indications are afforded by this type of sphygmogram, especially if it be obtained in the early stages of the disease and if it persists for several days. I have on several occasions observed

this pulse feature in the bronchopneumonic attacks of children at the height of the disease, but it was then quite a transient condition. Sometimes, however, this kind of pulse is found at a time when the child is apparently not very ill, and it persists day after day. I have never known recovery to take place under such circumstances. On one occasion I predicted the fatal event a fortnight before its occurrence, at a time when the child seemed to be in a fairly satisfactory condition, to judge from other symptoms. I therefore consider these sphygmographic appearances of the pulse

FIG. 7.

The worst type of pulse in bronchopneumonia. Occurs shortly before death. Child aged eight. Temperature, 103.5°; pulse, 160.

in bronchopneumonia to be of great significance in prognosis. I think this particular form of pulse-tracing may fairly be regarded as a *type,* which experience has proved to be of decidedly bad omen.

One other point about this pulse is that the percussion-wave may be either *pointed* or *rounded.* The predicrotic wave is always coalesced with it in these cases, but the *sharper* the apex of the tracing the *better* the prognosis. The worst possible type of curve is that in which there is a blunt-pointed apex and a wave of very small amplitude. The pulse-curves are also of unequal size. These are indications that the heart muscle is failing and probably that dilatation of the organ is commencing. Shortly before death in

FIG. 8.

Pulse in a case of late mitral stenosis.

bronchopneumonia a pulse-tracing showing these characters is often seen, as shown in Fig. 7. In cases of late mitral stenosis (Fig. 8) I have obtained very similar tracings, and also in children dying of autointoxication from the intestinal canal. Such a sphygmogram may also be had in the intense septic poisoning which sometimes affects puerperal women. (Fig. 9.)

I have already referred to the persistent tendency to failure of the blood-pressure in severe attacks of pneumonia in children. In the catarrhal variety this is especially the case, and if we cannot

arrest the fall very grave symptoms will result. In these cases I think the great lowering of the blood-pressure is primarily due to an intense relaxation of the blood-vessels all over the body. The general vasomotor tone seems to be entirely lost. This may possibly be due to a special toxin. The condition of the circulation seems to me to be somewhat similar to that found in a well-marked case of exophthalmic goitre, or the same state of things might be produced by great overdosing with thyroidin. In cases of severe bronchopneumonia in children the myocardium may suffer,

FIG. 9.

Pulse of fatal significance from a case of intense puerperal septicæmia.

partly from insufficient nutrition, owing to inadequate blood-supply through the coronary arteries, consequent upon the lowered blood-pressure. It has often occurred to me that if we could counteract this extreme relaxation of the blood-vessels we should be fulfilling one of the first indications of rational treatment.

In this connection I would suggest suprarenal extract as worthy of a trial. A sterilized decoction of the medulla of the gland might be injected into a superficial vein by means of a hypodermic syringe. I have not yet been able to test this method of treatment, but hope soon to have the opportunity of doing so. These cases are so fatal in young children, and chiefly so, I think, from cardiac failure, that one would gladly welcome any new measure which could be adopted with a fair prospect of success. It is not often that these children die from extensive implication of the lung tissue.

A FOREIGN BODY IN THE AIR-PASSAGES SIMULATING RAPID PHTHISIS.

BY JAMES B. WALKER, M.D.,

Philadelphia.

FOREIGN bodies in the air-passages are not rare: medical literature, remote and recent, is full of accounts of such truants. The cause of offence in my case was a watermelon-seed. I find two other such instances recorded, while the seeds of almost all fruits have figured in the various cases reported. The pits of the orange, plum, date, and cherry have contributed to harass the unwary swallower; so have grains of corn, beans, peas, heads of grass, peanut-shells, and pieces of meat, from the organic kingdom; while from the whole inorganic a list almost interminable can be given, including a carpet-tack, nail, dime, gold coin, half-sovereign, half-franc piece, flexible and silver tracheotomy-tubes, etc.

The *time* elapsing between the ingress and egress of the offender in my case was two months. This is quite long enough to retain a foreign substance in one's bronchus, but it is short in comparison with many whose records are open to investigation.

Jackson [1] reports a case in which a screw was expelled after three years. An umbrella-ferrule is reported to have been impacted in the left bronchus for two months. A silver tracheotomy-tube, loosened from its holder, lodged in the left bronchus for seven weeks before its removal. A head of rye was found at an autopsy twelve years after its introduction. Bridge reports [2] the removal of a button three years after its lodgement; Eldridge [3] reports the extraction of a foreign body twenty-three years afterwards. H. H. Smith, of Philadelphia, successfully removed by tracheotomy a grain of corn which had remained seven weeks and had begun to germinate. Bartlett publishes [4] a case of retention of a foreign body in a bronchus for sixty years, with final spontaneous expulsion.

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[1] Boston Med. and Surg. Journ., 1855.
[2] New York Med. Record, 1878.
[3] Rhode Island Med. Soc. Proc., 1860.
[4] New York Med. Journ., 1846.

Curtin reported a case in which a mutton bone gave rise to abscess in the lungs; and Hooker reports two cases with similar results.

From the almost complete occlusion of the left primary bronchus and the similarity of the resultant condition to acute phthisis my case appears to be somewhat unique, though no doubt a more thorough search than I have been able to make would have unveiled cases resembling it.

A girl, aged two and one-half years, was brought to my attention early in October, 1900. She was suffering from a cough, which had existed for over a month and was fast growing worse. She was pale and thin, with a constant harassing cough, and occasional severe paroxysms, terminating in vomiting. She was feeding poorly, and had rapidly changed from an exceedingly rosy and robust infant to a markedly emaciated child. Her temperature on examination was 101.3° F., pulse feeble and quick, and respirations somewhat labored. Physical examination of the chest revealed, on palpation, râle fremitus over the entire left chest, and, with inspection, greatly diminished expansion. On percussion no areas of consolidation, nor appreciable reduction of resonance, nor elevation of note were detected. Auscultation showed submucous râles and greatly diminished breath sounds, those which existed being simply feeble, without bronchial element. There was no sibilant nor musical note, as of air passing a constriction. The right side was normal, with exaggeration of mobility, etc.

The child was listless and apathetic, and at no time complained of pain, though happiest when lying in the crib or on the mother's lap. Her appetite was capricious, and the bowels were usually constipated, alternating with looseness, with evidences of indigestion in the discharges from the bowels.

The child's mother had lost her mother, two brothers, and one sister from pulmonary consumption, which, in all, ran a rapid course.

The case resembled an attack of *la grippe,* which so often shows a unilateral bronchitis; or an attack of acute phthisis arising from disseminated tuberculosis, though its confinement to one side absolutely, with the other entirely free from signs of invasion, rendered this hypothesis unlikely.

Inquiry as to the onset of the attack revealed the following his-

tory: about the 1st of September, while the child was eating a piece of watermelon, she was seized with a choking and coughing spell, and declared that she had "swallowed" a seed. Inversion and slapping the back were at once resorted to, but the distress was not relieved. The mother hastened with the child to a near-by hospital, at which a mid-day dispensary was in progress, and related her story, when another unsuccessful effort to dislodge the seed by gravity and succussion was made by the physician in attendance. She was dismissed with some medicine for the cough. A few days later another physician was asked to see the child, when he prescribed for the cough and dismissed the case. Since then the girl has continued to grow worse, until she was shown to me while I was visiting a sick relative living near.

I repeated the process of inversion and succussion without avail, and placing the child on appropriate food and supporting measures, watched her. In the next two weeks she gained somewhat in strength and ate better, but the physical condition of her lungs remained as before, and I almost decided that the melon-seed was but an incident, or perhaps an exciting cause, of what was now a tuberculous affection, and directed the mother to send me a sample of the sputum for examination. She was somewhat dilatory in doing this, and in a few days brought the child to my office, with the report that on the previous day, after a severe paroxysm of coughing, terminating in emesis, the child seemed to experience great relief and was now breathing easily. On examination I found air entering the left lung freely, though the cough still existed, and some râles were present. The vomited matters had been searched for the missing seed, but none was found. The child now gained each day, and the trouble seemed to be at an end, except that the cough remained. On November 3 another severe coughing-spell occurred; emesis followed, and the seed was brought to light. The cough immediately ceased, and in a short time the child became, and continues to be, a rollicking, round, rosy infant.

The first relief was evidently caused by the displacement of the seed, which, however, was not expelled until its final dislodgement and ejection by the last attack of emesis.

Neurology

TYPES OF HEMIPLEGIA.

CLINICAL LECTURE DELIVERED AT THE MASSACHUSETTS GENERAL HOSPITAL.

BY G. L. WALTON, M.D.,
Clinical Instructor in Neurology, Harvard University.

Gentlemen,—The cases that we have to study to-day illustrate the various phases of hemiplegia, some of which have been demonstrated only in recent years. Two of the patients present common types of hemiplegia; the third case is more obscure.

I. SENSORY AND MOTOR TYPE OF HEMIPLEGIA.

The first patient is a married woman, about fifty years of age. Some five years ago she had an apoplectic attack which was of rapid onset and was ushered in by spasmodic movements of the right arm and leg; there was loss of consciousness for perhaps half an hour. The spasms on the affected side were succeeded by complete motor paralysis, which has persisted, the primary flaccidity of the parts being replaced by a permanent condition of stiffness and contracture with athetoid movements. The arm, as you see, is flexed at the elbow; the wrist is in a position of moderate flexion; the fingers assume various awkward positions and are in a state of constant involuntary movement, that greatly interferes with even the simple acts for which she has power, as squeezing the hand. The attempt to button the clothes is ineffective. The gait on the affected side is spastic; she scuffs the right toe on the floor and the leg is swung out when brought forward. There is no evident facial paralysis, but that her face was originally involved is all the more probable because of the early appearance of aphasia, of which, however, no sign persists.

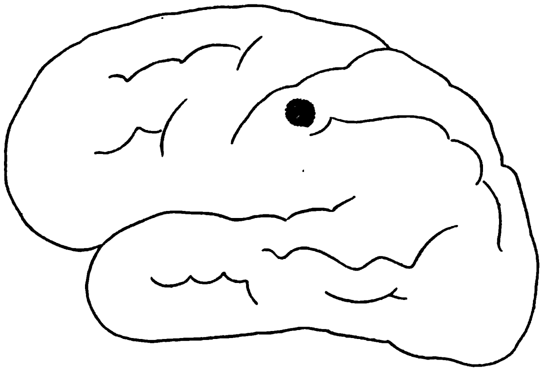
There is no history of headache, vomiting, vertigo, or other cerebral symptoms. Her history practically precludes progressive disease, as tumor, and establishes vascular lesion, probably hemorrhage, the spasms pointing to irritation resulting from the advance of the hemorrhage upon the motor tract, and the subsequent paralysis indicating partial destruction of that tract,—not complete destruction, for in that case the athetoid movement would not be present. The *history* has, therefore, enabled us to diagnosticate the *nature* of the lesion and helps us also towards the establishment of its *seat*. This branch of diagnosis, however, depends less upon the history than on the physical examination. The hemiplegia directs our attention to either the internal capsule or the cortex of the brain. The fact that the parts were simultaneously affected practically locates the lesion at the internal capsule, because at this point all fibres run together.

The examination up to this time has involved nothing beyond the common type of hemiplegia, resulting, for example, from rupture of one of the anterior perforating arteries, as the lenticulo-striate. Proceeding, however, to the question of sensation, we find that the case falls into a slightly different category. On placing an object in her right hand and asking her to name it with her eyes closed, she states that she is unable to do so, whereas when the object is placed in her left hand she finds no difficulty in recognizing it. This inability to recognize objects is called astereognosis, a symptom which has of late attracted considerable attention in connection with cerebral disorders. It has been found to exist in a large proportion of hemiplegics hitherto deemed of the purely motor type. This disability often appears notwithstanding the preservation of the touch, pain, and temperature senses, and it is because these are the senses most commonly tested that this form of anæsthesia has long evaded observation. Patients suffering from astereognosis are apt to lose, however, certain of the higher sensory faculties,—for example, the spacing sense, the localizing sense, and the posture sense. It will be noted that these senses involve a greater degree of intellectual discrimination than the recognition of pain, temperature, and touch, a fact which offers a clew to the analysis of astereognosis. It seems probable that the more rudimentary factors—that is, pain, temperature, and touch—are subserved by a less highly developed portion of the cerebral mechanism than that presiding over the more intellectual process of astereognosis. The exact seats of these

different processes have not been definitely determined. Authorities do not differ widely, however, as to the probable location of the stereognostic sense (sometimes termed "sense of active touch"); some place this function in the Rolandic region, others in the parietal.

The investigation of this, as of other branches of cerebral localization, is seriously handicapped by the fact that many cases lack careful clinical study and confirmation by post-mortem examination. Even those cases which are carefully observed and confirmed by autopsy or operation are liable to varied interpretation, because an apparently minute lesion may produce the most extensive symptoms. I have seen the removal of a bit of cortex, posterior to the fissure of

Fig. 1.



The shaded area represents a frequent seat of a lesion producing astereognosis.

Rolando, followed not only by paralysis of the arm and leg, but also by mind-blindness and word-deafness. Such considerations render it fallacious to draw general conclusions from individual cases; in fact, almost any single case may be made to conform to either of the existing theories. Whatever the exact seat of the stereognostic sense, it doubtless depends upon the correlated action of a physiological group of cells and fibres somewhat analogous to the kinæsthetic speech-centre in Broca's convolution. Just as this convolution receives stimuli from the visual, auditory, and other centres,—the stereognostic centre doubtless receives its stimuli from other less highly differentiated centres, for example, those subserving the senses of touch, pain, and temperature. If the latter senses have

There is no history of headache, vomiting, vertigo, or other cerebral symptoms. Her history practically precludes progressive disease, as tumor, and suggests a vascular lesion, probably hemorrhage, the spasms possibly being due to irritation resulting from the advance of the hemorrhage upon the motor tract, and the subsequent paralysis indicating partial destruction of this tract—not complete destruction, for in that case the power of movement would not be present. The history has therefore enabled us to diagnosticate the *nature* of the lesion and helps us also towards the establishment of its *seat*. This branch of diagnosis, however, depends less upon the history than on the physical examination. The hemiplegia directs our attention to either the internal capsule or the cortex of the brain. The fact that the parts were simultaneously affected practically locates the lesion at the internal capsule, because at this point all fibres run together.

The examination up to this time has involved nothing beyond the common type of hemiplegia resulting, for example, from rupture of one of the anterior perforating arteries, as the lenticulostriate. Proceeding, however, to the question of sensation, we find that the case falls into a slightly different category. On placing an object in her right hand and asking her to name it with her eyes closed, she states that she is unable to do so, whereas when the object is placed in her left hand she finds no difficulty in recognizing it. This inability to recognize objects is called astereognosis, a symptom which has of late attracted considerable attention in connection with cerebral disorders. It has been found to exist in a large proportion of hemiplegics hitherto deemed of the purely motor type. This disability often appears notwithstanding the preservation of the touch, pain, and temperature senses, and it is because these are the senses most commonly tested that this form of anæsthesia has long evaded observation. Patients suffering from astereognosis [illegible] apt to lose, however, certain of the higher sensor[illegible] ample, the spacing sense, the localizing se[illegible] It will be noted that these senses invo[illegible] intellectual discrimination than the [illegible] and touch, a fact which offers [illegible] It seems probable that the mo[illegible] temperature, and touch—ar[illegible] portion of the cerebral m[illegible] more intellectual process o[illegible]

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a cortical representation, that for the upper extremity, at least, probably occupies the parietal region. Whatever the exact mechanism of this function, it is important that you familiarize yourself with this not uncommon cerebral type of anæsthesia. (Fig. 1.)

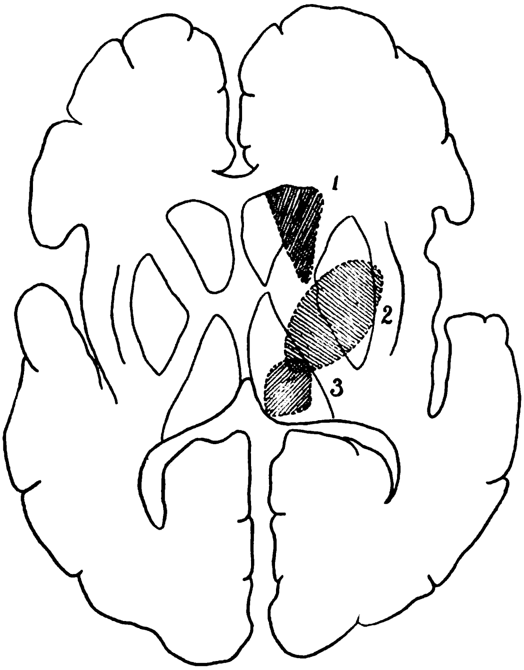
If in a given case you find simply loss of power to recognize objects with the eyes closed, but find preservation of pain, touch, and temperature senses, the chances are greatly in favor of a cortical lesion more or less circumscribed and involving the stereognostic centre. If, on the other hand, you detect loss of all varieties of sensation, the chances are that you have to do with a very extensive and perhaps deep cortical lesion, or else with a lesion at a lower stratum,—namely, in the internal capsule or optic thalamus. With these facts in view we will test this patient's sensations.

On asking her to close her eyes and state when she feels that she is touched, we find that she does not recognize the touch at all upon the hand and that her answers are very uncertain as we proceed up the arm. When we reach the shoulder, she answers promptly and correctly each time. On pinching the skin, we find that the analgesia follows the same rule. On touching her with two test-tubes, one filled with cold and the other with warm water, we find that she does not recognize the warm test-tube until we reach a point above the elbow, although she recognizes the cold one almost everywhere. On testing her *posture sense,* we find that she does not know that the last phalanx is elevated or depressed, though she feels the movements of the wrist and elbow. In testing her *spacing sense* we place two points upon her finger and ask if she can state whether she is touched by one or two points, and she says that she feels nothing. This result was to have been expected, as the loss of the touch sense, of course, involves the loss of the space sense as well as of the stereognostic sense.

The variety of anæsthesia that we have demonstrated in this case does not conform, therefore, to the simple astereognostic type, but presents another well-recognized type of cerebral anæsthesia, indicating either a very extensive cortical lesion or a lesion of the posterior part of the internal capsule. The history of the case leads us to favor the latter location, a decision which is strengthened by her statement that vision was impaired at the time of the injury. We shall make a careful examination of the visual field, and, if we find that her sight is still impaired for objects upon the right side of the

field (hemianopsia), this will further verify the seat of lesion.[1] (Fig. 2.)

FIG. 2.



Areas of hemorrhage from perforating arteries. 1, Lenticulostriate; 2, lenticulo-optic; 3, external optic. (After Dana.)

To return to the question of the artery affected, we must suppose either that the rupture of the lenticulostriate produced a hemorrhage extending well back into the internal capsule, or that a hemorrhage of the more posteriorly located lenticulo-optic extended forward so as to affect the motor as well as the sensory fibres of the internal capsule. The latter supposition is the more probable.

There is one other point to which I wish to draw your attention, —namely, the reflexes. With the exaggerated knee-jerk of pyramidal disease we have been acquainted ever since Westphal pointed out its importance. With the ankle-clonus also we have long been familiar. To these signs of pyramidal disease has recently been added a third,

[1] This test was not made before the patient left the clinic, and, as she is an out-patient, the opportunity to complete this part of the examination has not yet presented itself.

—namely, the so-called Babinski reflex. This phenomenon consists in a deliberate and constant elevation of the great toe on stroking the sole of the foot. It is almost pathognomonic of organic disease affecting the pyramidal tract somewhere in its course; its practical value lies in the fact that it is more constant than the ankle-clonus and more nearly pathognomonic than the exaggerated knee-jerk. As you see, in this case the phenomenon is present, while the knee-jerk is only moderately increased and no continuous ankle-clonus can be elicited.

The frequency of the Babinski reflex in hemiplegia has been variously estimated, Cestan and Le Sourde placing it as high as ninety-two per cent. In a recent study of the subject made by Dr. Paul and myself, the phenomenon appeared in one hundred and forty out of two hundred hemiplegics examined in this hospital and elsewhere,—that is, in seventy per cent.

II. MOTOR TYPE OF HEMIPLEGIA.

Before proceeding to the unusual case, it will serve to remind you of the common types if I present a patient with pure motor hemiplegia. This is a man of fifty, with atheromatous arteries, who suffered an apoplectic attack about two years ago. The onset was fairly rapid, the patient becoming unconscious in perhaps an hour or two. Upon recovering consciousness twelve hours later, he was paralyzed on the right side and was unable to speak. The palsy of the limbs was at first flaccid, but is now spastic. After three weeks he gradually recovered his power of speech, though, as you see, it is still defective. The paralysis included his face, arm, and leg, which were all involved simultaneously. He drags the right foot stiffly in walking, and swings the leg outward so as to lift it as far as possible. The knee-jerk is markedly exaggerated, continuous ankle-clonus is elicited, and the Babinski reflex is present. You will note that a quick stroke on the sole of the foot fails to produce elevation of the toe, but that this elevation appears promptly upon a long, even stroke extending the length of the sole, and that the movement is more complete when this stroke is made upon the outer side of the foot than when it is made in the middle. It is also plainly brought out by a stroke on the inside of the sole carried fully through to the ball of the great toe, the extension being most marked as the stroke is made under the ball of the toe. You will also

FIG. 3.—Typical contracture of hemiplegia.

Fig. 4.—Less common variety of spasm following cerebral hemorrhage.

observe that the extension of the great toe is *constant* and that it is *deliberate;* an inconstant and rapid elevation of the toe not infrequently appears in sensitive persons as a result of ticklishness; such a movement is not to be mistaken for the Babinski reflex, which is purely mechanical. When the Babinski reflex is present, the outer toes may be extended and separated, they may be depressed, or they may remain quiet; their movement is comparatively unimportant. The normal plantar reflex consists in flexion of the toes, the great toe remaining quiet, or (in an appreciable proportion of normal individuals) in no movement whatever.

With regard to this patient's speech you may note a certain hesitancy and explosive character, as if the words were forced out against resistance. I shall venture to designate this variety of speech as spastic. This probably represents the remains of that form of speech defect called by some authorities "motor aphasia," by others "aphemia," by others "subcortical aphasia." I refer to the defect produced by lesion of the motor tract at a lower level than Broca's convolution. The defect in this case is somewhat more extensive than is covered by this designation, but we shall postpone the complete analysis of the defect, and I shall show the patient again in a lecture upon aphasia.

I wish to call your attention particularly to the facial paresis. Some authorities state that in facial paralysis of central origin the muscles of the upper part of the face are spared, as shown by the fact that the patient can close the eyes and wrinkle the forehead. This statement is not quite accurate. It is true that such patients can close both eyes together, but, as a rule, they cannot close separately the eye on the paralyzed side. When I ask this patient, for example, to close both eyes, he does so perfectly; when I ask him to close the left eye alone, he does this also with ease; but when I ask him to close the right eye alone, he finds it impossible to do so, although he is sure that in health he was able to close separately the right as well as the left eye. It is perhaps, therefore, more accurate to say that the right orbicularis palpebrarum *is* involved in the paralysis, and that it cannot be closed *except in conjunction with the other,* a combined movement for which a stimulus from the healthy side of the brain suffices.

This patient has not even the moderate degree of anæsthesia known as astereognosis. An object placed in his hand while his

eyes are closed is immediately recognized. He can even distinguish between different coins. It has been suggested that the reason so large a proportion of astereognosis has been found in hemiplegia is that the immobility of the fingers prevents the manipulation necessary to the recognition of objects by touch. Now, this man's fingers are tightly clinched into the palm, and absolutely no movement is possible. I have to separate the fingers from the palm in order to insert the object, and it is with some difficulty that the object is removed after the test is over. Notwithstanding this immobility, the objects are promptly and accurately recognized.

This case, then, represents the purely motor type, resulting from lesion of the anterior portion of the internal capsule, a type less common than we suppose before attention was called to cerebral anæsthesia in its modern aspect.

I show several photographs illustrating different forms of hemiplegic contracture. (Figs. 3 and 4.)

III. MONOPLEGIA WITH JACKSONIAN CONVULSIONS.

The diagnosis of our third case is comparatively easy as regards location, but as to the nature of the lesion it is more obscure.

This is a man of about forty-five years, with a rather vague history of venereal infection many years ago. He has been subject to attacks of Jacksonian epilepsy for the last two years. The attacks vary in frequency, sometimes occurring at intervals of several weeks, again appearing seven times in one day. The spasm always begins in the left hand, passes up the arm, then down the leg. This order of procedure almost inevitably points to cortical lesion. He has not complained of headache except in the past two weeks, and even during this time it has not been so severe as to keep him awake at night. No nausea or vomiting has occurred. There is no defect of vision. His urine is normal. Physical examination shows paresis of the left hand, with which, for example, he cannot button his clothes or make any fine movements. The sensation of the left hand, as of other parts of the body, is normal; even the stereognostic sense is retained. The physical examination, then, points readily to the seat of the lesion,—namely, the hand centre in the motor cortex (mid-Rolandic region); it would be highly improbable that a capsular lesion should select the hand fibres, leaving the face and leg fibres intact. The history tends to confirm this

diagnosis, inasmuch as Jacksonian epilepsy points to the cortical (or subcortical) region. The lesion is probably rather anterior than posterior to the fissure of Rolando, for if posterior it would have been much more apt to produce astereognosis. (Fig. 5.)

With regard to the nature of the lesion in this case we must think of gumma or other tumor, sclerosis, hemorrhagic pachymeningitis, general paralysis, syphilis of the brain (gummatous meningitis), and progressive softening from vascular occlusion (thrombosis).

While we cannot absolutely exclude a slowly growing tumor with frequent hemorrhages into its substance, the existence of such a

FIG. 5.

Probable seat of the lesion in Case III.

tumor for two years without producing headache, vomiting, or optic neuritis would be very unlikely.

Nor can sclerosis be absolutely discarded; but it is extremely improbable that this disease should limit its evidence to that of a single *plaque* in the Rolandic region, and that this *plaque* should be so active in its progress as to produce this large number of Jacksonian attacks.

Hemorrhagic pachymeningitis, if any evidence of the disease appears during life, is usually shown by headache and by successive attacks of hemiplegia, but not, as far as I am aware, by frequent attacks of Jacksonian epilepsy. The symptoms of general paralysis are rarely limited to those here present. It is true that apoplectiform and epileptiform attacks are prone to occur in this disease, rarely, however, as isolated symptoms. Examination of the general paralytic who had suffered from repeated attacks of this nature

would probably show one or all of the following symptoms: change of gait and of manner, alteration of disposition (excitability or indifference), tremor of the tongue and lips, slurring and imperfect speech, frequent errors in handwriting, and possibly attacks of mania and depression. It is true that our patient is somewhat slow of comprehension and complains of failing memory, but none of the characteristic symptoms of general paralysis are elicited either by our own examination or by the history obtained from his wife.

Syphilis of the convexity (gummatous meningitis) sufficiently active to produce repeated attacks of spasm would probably have caused severe headache also.

While we are not justified, perhaps, in absolutely excluding any of the diseases so far mentioned, the case does not fall fairly into either category.

We have still one lesion to consider,—namely, progressive softening from vascular occlusion. Syphilitic infection furnishes a not uncommon source of such occlusion,—namely, syphilitic arteritis. The central convolutions are by no means unusual localities for this affection, through thrombotic closure of one of the branches of the middle cerebral artery. The resultant softening (probably of the variety termed red softening, since the gray matter of the cortex is involved) advances gradually, without producing marked symptoms of pressure, and sometimes produces repeated attacks of Jacksonian epilepsy, perhaps as a result of frequent minute hemorrhages into the substance of the softened tissue. This seems to me, on the whole, the most satisfactory diagnosis.

This patient will be placed upon increasing doses of iodide of potassium, though without much enthusiasm, as these late syphilitic changes are far less amenable to treatment than those appearing at an earlier stage. Operation is to be considered, but should be undertaken only as a forlorn hope, on account of the improbability that a remediable lesion would be disclosed.

[NOTE.—The headache grew steadily worse, optic neuritis appeared, and operation was advised by Dr. Putnam and performed by Dr. Warren. The skull was removed at the point indicated. The dura was tense, the brain protruded forcibly on incising the dura, but neither palpation nor exploration by the hollow needle revealed remediable lesion. The operation was therefore carried no further. The signs of increasing pressure and the optic neuritis now render tumor the probable diagnosis, perhaps glioma.]

A TYPICAL CASE OF PARKINSON'S DISEASE (PARALYSIS AGITANS).

BY WILLIAM C. KRAUSS, M.D.,

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PARKINSON'S disease is not so rare that individual cases merit publicity, neither need any exhaustive study of the clinical symptoms be undertaken in order to throw light on its symptomatology, as that is well understood at the present time. The following case is reported simply because it impressed the writer as a typical or ideal case of this disease, strong in the positive symptoms and equally strong in the negative ones.

John F., aged seventy-seven years, is a native of the United States, married, and a horse-trainer by occupation. Nothing of note can be gleaned from his family history except that two sisters died of tuberculosis. He had chicken-pox, measles, and scarlet fever when a child, and whooping-cough at the age of sixteen. He spent the first twenty-five years of his life on a farm. When about seventeen years of age, while working in the woods, he was struck on the top of his head by a falling tree, and was rendered unconscious for three days, but no permanent trouble resulted. At the age of twenty he came near being drowned, sinking twice before being rescued. This accident was followed by severe headache, dizziness, and roaring in the ears, which lasted about four days, but finally entirely disappeared. At the age of twenty-one he had severe inflammation of the eyes, which caused almost complete blindness; for a period of five months he could only distinguish between light and darkness. When twenty-five years old he began his occupation as horse-trainer, which he has followed ever since. At the age of sixty he had an attack of sciatica, which lasted about six months and has not recurred. He passed through an attack of the grippe seven years ago and has repeatedly had recurrent attacks. He is a total abstainer from alcoholic drinks, does not use tobacco in any form, and denies all history of syphilis.

His present illness began seven years ago, when he noticed a fine tremor of the right hand which he could not control. Gradually the fibrillary movements became coarser and extended up the arm. At the same time the whole member became somewhat rigid and assumed a flexed condition at the different joints. The right foot and leg next developed the tremor and rigidity, then the left foot and leg, and about two years ago the left hand and arm became similarly affected. In a jovial manner he declares that he possesses what men have sought to invent for centuries past,—namely, "perpetual motion." His voluntary movements are slow and measured, his gait is labored, his speech slow and hesitating; but, when once started, voluntary motion, gait, and speech became exaggerated. Propulsion and retropulsion are present. He sleeps poorly and is very restless at night, but otherwise enjoys fairly good health, spending the winters at the Erie County Hospital and the summers in the paddocks with the horses.

Objectively, he presents a typical picture of Parkinson's disease. Patriarchal in his appearance, with long, snowy-white hair hanging down over his shoulders, a long, heavy, milky-white beard extending down nearly to the umbilicus, and his keen bright eyes revealing an intellect in marked contrast to his physical decadence,—he is an ideal "old man of the hills," a personification of senility. His attitude is that of a manikin bent at every joint. The vertebræ are inclined forward, giving the body the characteristic stooping position; the shoulder, elbow, carpal, metacarpal, hip, knee, and ankle-joints are all in a state of partial flexion. The only joints not so affected are the tarsal and metatarsal. (Figs. 1 and 2.)

A tremor pervades the whole body, including the head, lips, and tongue. It is most pronounced, however, in the hands and to a less degree in the feet. Declaring that he has the secret of "perpetual motion," he will not be convinced that the tremor ceases during sleep; it also stops for a few seconds when voluntary movement is undertaken; otherwise it is always active. There is marked rigidity of all the voluntary muscles, and the patient's movements are slow and heavy at first, afterwards becoming more natural and even rapid. He does not complain of fatigue even after standing or walking, and is possessed of considerable endurance and vitality in spite of his age and disease. Mentally he is unusually clear, and, once started, it is difficult to restrain him in his reminiscences of former days.

FIG. 1.—Patient affected with paralysis agitans

FIG. 2.—Picture of patient standing.

THE ETIOLOGY AND TREATMENT OF ACUTE MYELITIS.

CLINICAL LECTURE DELIVERED AT THE UNIVERSITY OF BUCHAREST, ROUMANIA.

BY PROFESSOR G. MARINESCO,

Professor of Nervous Diseases at the University of Bucharest.

Gentlemen,—Some time ago we had occasion to examine a man, about thirty-five years of age, who was suffering from a combination of meningitis and myelitis. The inflammatory disturbance in the cord and its covering was of a disseminated type and presented many points of remarkable interest. A few days before entering the hospital the patient was suddenly stricken with paraplegia of his legs, accompanied by a rise in temperature and by a general systemic reaction. A little later the sphincters became involved and his condition grew very serious. One of his most prominent symptoms was an attack of acute double parotitis, so that he very much resembled a person suffering from the mumps. As no history could be obtained of his ever having had that disease, the case was diagnosed as one of acute myelitis and infectious parotitis, or mumps. There was at least a suspicion that the acute myelitis might be secondary to the mumps. After only a few days' suffering the patient died.

Post mortem it was found that the parotid glands had been changed into veritable abscess-cavities. The bacteriological examination revealed the presence of a pathogenic staphylococcus. The most interesting result of the autopsy, however, was the discovery of a number of foci of myelitis scattered here and there through the white substance of the cord and also, though much more rarely, in the gray matter. The meningitis was very characteristic. The bacteriological examination of the spinal cord showed that some at least of the foci of inflammation in the substance of the nerve contained a pathogenic staphylococcus.

Some of these specimens may be used to illustrate the modern views as to the etiology of myelitis. For instance, in a section of the cord and of the meninges there is seen considerable infiltra-

tion of the pia mater and its blood-vessels; it also demonstrates that the neuroglia-cells of the white substance of the cord are multiplied. Other sections of the cord show a number of leucocytes gathered in an inflammatory focus, many of them containing numbers of micrococci, which are really the staphylococci that originated the disease.

Years ago Professor Marie said, "The idea which should be fundamental as regards the pathogeny of myelitis is that nearly all these affections are essentially secondary. Though it has been long said, and was for a long time thought, there is no such thing as primary myelitis. The inflammatory process is always due either to a deterioration of the cord or to some systemic disease, or to the extension to the cord of some local affection situated in an organ more or less distant from this part of the central nervous system. The true initial causes of myelitis are either infections or intoxications,—that is to say, toxæmias." Professor Marie's words are as true now as they were when he wrote his remarkable article on myelitis for Charcot-Bouchard's treatise on medicine.

The history of myelitis shows how neurologists generally have come to accept this conclusion. Professor von Leyden, the distinguished German clinician, to whom we are indebted for so many suggestive remarks with regard to diseases of the central nervous system, in his classic text-book on the diseases of the spinal cord, admirably described the clinical symptoms and the pathology of myelitis as early as the year 1875. There is but one thing lacking in his treatment of the subject, and that is the consideration of its etiology. At that time the microbic theory had not obtained a firm foothold in medicine; hence it is not surprising that the chapter on etiology is deficient. In 1879 those acute German observers, Kahler and Pick, called attention to the frequency with which disseminated sclerosis of the spinal cord—what the French call *sclérose en plaques*—occurred after certain acute infectious diseases, and attributed its origin to infection. Professor Marie became the teacher of this doctrine in France. He even widened its application so far as to say that practically all the affections of the spinal cord, with the exception of hereditary pathological conditions and amyotrophic lateral sclerosis, were due either to an infection or to a toxæmia. Since then these views of Marie's have come to be accepted very generally throughout the medical world.

The classification of myelitis according to the situation of the lesion, as laid down by Leyden and Goldscheider, seems worthy of acceptance. They suggest the following types: first, acute transverse myelitis; second, acute diffuse myelitis, ascending and descending; third, acute disseminated myelitis; fourth, acute anterior poliomyelitis. The first two types of the disease, despite certain resemblances to each other, are distinct pathologic forms. In all these varieties of acute myelitis we find a certain degree of hemorrhagic softening as one of the pathological conditions. Indeed, Oppenheim classifies softening of the spinal cord as one type of myelitis. At the autopsy the cord is found swollen, softened, even diffluent. In transverse section it is apt to be crushed together. The gray matter is injected and at times even streaked with blood.

The principal lesion, whatever be the form of the myelitis, has a maximum of intensity at one part. This may be seen especially in the transverse type, but is found also in diffused myelitis. The softening is undoubtedly due to disturbance of the circulation of the cord. Corresponding alterations occur after ligature of the aorta or in the brain as the result of pathological obliteration of the cerebral arteries. Experimentally similar changes have been produced by the injection of inert powders into arteries, where they produce thrombosis and consequent circulatory arrest. Besides the disturbance of the circulation, however, the presence of infectious agents must not be forgotten. The direct action of the microbes and their toxins upon the delicate nervous substance of the spinal cord is undoubtedly productive of intense deterioration. These modifications in the nervous substance may even result in a sort of melting of the tissues. After the acute inflammatory process in the cord has subsided, if it does so without causing a fatal termination, the area of softening lessens gradually in size and the softened tissues are replaced by sclerotic patches. At times, however, where the inflammation has been intense, there are areolar foci in the white substance of the cord.

The starting-point for the infectious agents which finally invade the spinal cord is commonly a lesion either of some part of the cutaneous surface or of a mucous membrane the vital resistance of which has been previously altered by the presence of infectious agents. A few examples of the conditions under which myelitis has developed will best illustrate how this secondary infection takes place. Some

time ago, for instance, I published with Ettinger a very interesting case in which myelitis followed an attack of smallpox; Roger and Damaschino and Westphal and von Leyden had previously seen similar cases. Strümpell reported a case of acute myelitis following a whitlow or felon.

There are also numerous interesting observations of acute myelitis due to microbic infection through an affected mucous surface. For instance, a number of cases have been reported as following tonsillitis. Several good observers have seen the disease occur after typhoid fever. Dysentery is another source of myelitis. Its development after gonorrhœa has been observed by Gull, Dufour, von Leyden, Ullmann, Gowers, Raymond, Hayem, and Parmentier. Myelitis is a not infrequent sequel of pneumonia, and this serious condition adds another to the many dangers of pulmonary affection.

As might be expected, influenza, which is so often complicated by manifestations in various parts of the nervous system, is especially liable to cause myelitis, as shown by reports from many parts of the world. Laveran has seen such cases in France, von Leyden in Germany, Babes in Roumania, and other observers elsewhere. At least one recent case has been reported in which myelitis occurred as a complication of cystitis or of pyelonephritis. As may be seen from these reported cases, the microbic infection which gives rise to acute myelitis may gain entrance almost anywhere in the body.

Acute myelitis is not so common as it was formerly believed to be. The number of cases of cutaneous mucous or visceral infections that give rise to acute myelitis are when compared with the whole number of such affections extremely rare. The specific cause in any given case for the occurrence of myelitis is not easy to find. We must suppose either that the microbe has taken on a special virulence or that it has found a soil especially favorable for its growth because of a diminution in the vital resistance of the nervous tissues in the spinal cord. Of course both these factors may be combined in the etiology, and myelitis may develop only when lowered vital resistance and heightened virulence coincide in the same individual.

Personally I am disposed to believe that in most cases of acute myelitis a special state of vulnerability of the spinal cord exists. It is this vulnerability which localizes the complicating infection in the spinal axis of the central nervous system. Of course this does not exclude the essential *rôle* that is played by microbic virulence.

The infections, however, which cause acute myelitis in the human subject are mostly those which are quite common. These infections usually produce no serious complications except in patients very much predisposed. A secondary infection is sometimes the direct causative factor of intense myelitis. My own experience in this matter has been confirmed by that of many good observers.

Among the avenues of entrance for microbes and perhaps also for toxins capable of producing acute myelitis are the peripheral nerves. When the nerve-sheaths become exposed to invasion by microbic agents,—as happens, for example, in hydrophobia or rabies,—they may find their way up to the central nervous system. This may also happen in gangrenous ulceration of the skin, which leaves the nerves and their ramifications open to microbic invasion. The bacteria find their way along the lymphatic vessels of the affected nerve and, either by their actual presence or by means of their toxic products, affect the spinal cord, giving rise to what is called acute myelitis consecutive to ascending neuritis. The term "ascending neuritis" was formerly used too broadly. Many different affections were supposed to be included under it, so that some neurologists of authority admitted its existence only dubiously or were entirely sceptical about it. I am personally convinced, however, of the existence of an ascending neuritis as a distinct affection of the nervous system. This view has always been upheld by Professor von Leyden, who even goes so far as to maintain that there is a true ascending neuritis in certain cases of paraplegia which are sometimes spoken of as reflex.

I have had an opportunity to study the nervous system in three cases of rabies in the human subject, one of which for three days before death presented symptoms that pointed clinically to the existence of an ascending paralysis. In all three of the cases there were severe lesions in the spinal ganglia, in the jugular and sympathetic ganglia, and in both Gasserian ganglia. The spinal cord showed vascular dilatation and hyperæmia besides perivascular infiltration with leucocytes. This surely pointed to an ascending invasion.

I have insisted very much on the *rôle* which microbes play in the production of acute myelitis, which, however, may undoubtedly be due to other factors. Pathological investigations and experimental researches have shown that there are cases of acute myelitis, with all the usual organic reactions of the disease, where one finds

no inflammatory focus as the point of origin of infectious agents. There are two hypotheses on which such cases may be explained. The first is that the microbes have had a habitat at some place in the body from which the secondary invasion of the spinal cord has taken place, but the original lesion has disappeared before the fatal termination of the myelitis. Cases have been reported that make this explanation seem not unlikely in some rare conditions. The other hypothesis is that from the very beginning the myelitis was produced not by microbes, but by toxic substances, usually microbic toxins.

Unfortunately, microbic toxins are very little understood, and their study and the demonstration of their existence constitute a difficult problem. The *rôle* which toxic substances may play, then, whether of internal or external origin, but not manufactured by microbes actually existent in the spinal cord, remains as one of the very interesting chapters that science will doubtless soon open up for us. That the action of such toxins is real seems clear from certain recent investigations with regard to botulism. This is the disease that is caused by microbes found especially in decaying meat. I have shown in certain recent cases of the malady that an inflammation of the spinal cord is caused by these toxins, though the microbes themselves are in the intestinal canal. My observations and conclusions in this matter were confirmed by Pollak and Kempner.

In clinical accounts of acute myelitis cold and traumatism are frequently set down as causes; before the days of modern bacteriology, and especially its application to the study of myelitis, these were supposed to be the most frequent active agents, though idiopathic myelitis was sometimes mentioned. At the present time we are not willing to admit that cold and traumatism are ever direct causes of myelitis. It would seem that they have little influence in this direction except by producing points of lessened resistance favorable to microbic invasion. I have investigated this question by a series of experiments on animals, but have never succeeded in producing by refrigeration or repeated traumatism any true condition of myelitis.

It is, as a rule, not difficult to produce myelitis in animals by the injection of certain microbes into the spinal canal or even into the veins of the ear. From our experiments, which were very numerous, we might conclude that neither cold nor traumatism is of itself sufficient directly to produce acute myelitis in animals. It

does not seem advisable, however, to apply this conclusion absolutely to human beings. There is in this regard a distinct difference between men and animals, inasmuch as in man the nervous predisposition—that is, the existence of a lowered state of nervous vitality—plays a much more important *rôle* than it does in an animal.

If we combine observations made in experimental researches with the knowledge gained from autopsies, I think we may conclude that the form of the acute myelitis depends much upon the route taken by the microbes in the course of their transmission. If they enter the spinal cord by way of the arteries, they give rise especially to poliomyelitis, the most familiar form of which, acute anterior poliomyelitis, represents an invasion of the blood-stream of children by micro-organisms. If the microbes find their way into the spinal canal, they cause a meningomyelitis at the level where they gain entrance, and the pathological condition gradually diminishes upward and downward away from the original lesion. According to the special vascular system affected, one can find in different observations transverse myelitis, disseminated myelitis, or poliomyelitis. The ascending paralysis of Landry, when it originates in the cord, is the result of a diffuse myelitis, with its principal focus and maximum intensity in the dorso-lumbar region, growing less as it ascends, and mainly localized in the anterior portion of the cord.

The main feature of the inflammatory reaction in myelitis is the congestion; this may go on to hemorrhagic exudation. In certain fulminant forms of myelitis the pathological process may stop at this stage, with disorganization of the nervous tissues. Usually, however, there is an exudation of leucocytes from the blood-vessels. These sometimes constitute veritable perivascular nodules. The leucocytes are usually mononuclear, and gather not only in the walls of the vessels and in the perivascular spaces, but also within the vessel, so as sometimes to occlude its lumen. This leucocytic reaction is always due to the presence of microbes. The hyperæmia and diapedesis observed may be due to the occurrence of vasomotor disturbance, as Bouchard and his school teach, or it may be the result of the chemical attraction or repulsion of the toxins of the microbes present, the positive chemiotaxis of Metschnikoff and his school.

The reactionary phenomena noted in the cord are not, however, entirely limited to the vascular system: other structural tissues in the cord become interested in it. We find practically from the be-

ginning an evident reaction on the part of the neuroglia of the cord. There is a distinct swelling of the cell body, with increase in size of the nucleus. The cell stains much more intensely. Neuroglia-cells are always numerous in the neighborhood of myelitic areas, and it is evident that there is a new formation. After a time the neuroglia-cells decrease in size individually and take on a fibrillary character. The other element in the inflammatory reaction in the cord is a degeneration of the true nerve-cells. This has been demonstrated by the change in the staining reaction of the cells, and can be seen in the sections of this case.

As is well known, infectious myelitis is an extremely serious disease, which is affected but little—in most cases not at all—by ordinary medication. The future of the treatment of infectious myelitis evidently depends essentially on the advance of serum therapy. There are to-day but very few successful serums in our therapeutic armamentarium. So it may be said that in the present state of our knowledge the preventive and curative treatment of myelitis is practicallly impossible. We have a serum that is effective against diphtheria. But we have no antitoxin and no antimicrobin that is efficacious against the streptococcus, the pneumococcus, or the staphylococcus, or against Pfeiffer's bacillus of influenza. These are the ordinary active agents in the etiology of myelitis.

There was some hope that the antistreptococcic serum might be of great service in the treatment of certain cases in acute myelitis. I have, however, made a large number of experiments upon animals with Marmorek's serum, but the results obtained have not been satisfactory. In a number of observations, after injecting streptococci into the spinal canal and then antistreptococcic serum at varying periods afterwards, I have never succeeded in entirely arresting the inflammatory reaction due to the microbes. There is, however, no doubt that in my experiments animals to which injections of antistreptococcic serum were given at the same time that the streptococci were introduced into the spinal canal succumbed later than control animals not treated with serum. In dogs to which Marmorek's serum was given the phagocytic action of the leucocytes became very manifest after inoculation with streptococci.

If a large quantity of a culture of virulent streptococci be injected into the veins of the ear of a rabbit and at the same time

antistreptococcic serum is introduced into the spinal canal, phagocytosis is manifestly excited to a marked degree in the vessels of the pia mater and even in those of the spinal cord itself. Within the leucocytes that occur so abundantly in these situations large numbers of streptococci are found. In this case, moreover, it would seem that the streptococci had been attracted into the spinal canal after the injection of the serum and there devoured by the leucocytes. Usually streptococci injected into the veins of the ear are not found in the spinal canal, either by the examination of microscopic sections or even by the more delicate method of cultures.

Microbes introduced into the spinal canal do not always produce pathological conditions. Sometimes they disappear completely without causing the slightest apparent lesion. At other times they multiply very abundantly, either freely or in the interior of the cells. They do not always grow characteristically, but may assume degenerate forms. Streptococci, for instance, may develop in short chains or as small granules resembling simple cocci.

Serum therapy, then, is at present entirely incapable of preventing the pathological changes that occur in acute myelitis or of relieving the symptoms after the condition has been established. In recent years we have learned to inject various medicinal substances into the spinal cord without the fear formerly felt of producing serious results. The hope that our therapy of myelitis would be improved in this way has so far not been realized. There is no antiseptic substance that can be injected into the spinal canal to combat the microbes therein without at the same time destroying the nervous tissue.

I have more than once injected methylene blue in a solution of artificial serum into the spinal canal of man or animal. The injections did not produce any untoward results, but they had no apparent effect upon the myelitis. Hence in our treatment of this disease we are limited to the management of the symptoms as far as possible, to the prevention of complications, and to making our patients as comfortable as may be under the circumstances.

Among the symptoms which must be specially combated are the secondary infections due to the fact that the tissues lack their normal vitality because of the absence of the usual trophic influences from the cord. The most common of these secondary infections are cystitis, pyelonephritis, etc., and the greatest care in the selection of

the diet and the management of the excretions is necessary in order to prevent these affections. Another complication, that is often serious or even fatal, is the acute decubitus, or bed-sore, which is so liable to develop in these cases. This can be prevented by careful attention to cleanliness and by a special bed which prevents excrementitious material from remaining under the patient. If no other method will suffice, the invalid may be preserved from this complication by a continuous bath. In a very painful case of acute myelitis I succeeded in lessening the suffering by means of an injection of cocaine into the spinal canal. It is needless to say that the patient's general condition must be carefully watched and tonics and antipyretics employed as the indications demand.

FIG. 1.—Photograph of patient's brother.

FIG. 2.—Showing enlarged finger-tips of patient's child.

FIG. 3.—Picture of patient's hands compared with a normal hand.

FIG. 4.—Picture of patient's feet compared with a normal foot.

A CASE OF PULMONARY OSTEO-ARTHROPATHY.

BY RICHARD COLE NEWTON, M.D., AND ELIZABETH MERCELIS, M.D.

Montclair, New Jersey.

J. T., married, aged thirty-three, Hungarian laborer, came into the Mountainside Hospital, Montclair, on July 28, 1900, with a large abscess in the right axilla.

Family History.—The members of his father's family suffered from cough and shortness of breath, and died, as a rule, of some lung trouble. His paternal grandfather had the clubbed finger tips and " big nails." His father, who was an asthmatic, died of cholera at thirty-six. He did not have the " big nails." His mother is living, at fifty-six, and enjoys fair health, but is subject to rheumatism; she has not the enlarged nails. His sister died at two years, of unknown cause. His brother is living, at twenty-seven, and is in good health; he has a photograph of his brother (Fig. 1), who appears to be a fairly well-nourished young man, and the " big nails" can be discerned in the picture. Patient says that his ancestors have always been sober and industrious; no history of intemperance or nervous or mental disease obtainable. The patient's wife is living at twenty-seven. They have had four children, one of whom was drowned at two and one-half years; one died at seven days, of unknown cause; one at six months, of " jaundice"; and one, a girl, is living, at four, and is reported to be healthy. Patient says that all of his children had the big nails. A photograph of his little daughter shows a well-appearing child, with enlarged finger tips and clubbed nails (Fig. 2).

Previous History.—Our patient denies rheumatism or intemperance in himself or wife. Cannot recollect ever receiving a severe injury or a shock, either bodily or mental. When thirteen years old he suffered from frontal headache, which ceased without treatment. A year later he had the mumps. Does not remember suffering from any other infectious disease. He has always coughed more or less on rising in the morning. In 1888 he contracted a venereal ulcer,

the cicatrix of which can be seen on the dorsum of the penis, near the corona. The edges of the cicatrix are somewhat dim and ill defined; a small, hard ridge, however, runs through it. Patient says that the ulcer healed in three weeks, and no secondary symptoms appeared. He saw a doctor for the trouble twice. He took some medicine, and used an ointment. The treatment lasted only two weeks. At nineteen years of age he was examined for the Hungarian army, and was rejected for "weak chest." He says that he was examined four times for military service, and always rejected. He denies gonorrhœa and any urinary or bladder trouble. He says that his general health and vigor have improved of late years.[1]

Condition on Admission.—The patient sought treatment for a very large axillary abscess. This was freely incised, discharging a large quantity of pus. A superficial examination of the chest revealed nothing abnormal. Urinary tests gave a negative result. The enormous size of the ends of the fingers and toes and the nails was noted (see Figs. 3 and 4), as well as the marked enlargement of the distal extremities of the bones of the forearms and legs and the condyles of the femora. The man was emaciated, with a sallow and somewhat pigmented skin. He was clumsy in his movements. His intelligence was fair. The spleen and liver were not perceptibly enlarged. Bowels sluggish; appetite good. Owing to the size of his abscess and the pain which motion gave the patient, the chest and abdomen were not thoroughly inspected until some time after his admission to the hospital. His blood, however, was examined by one of us, and revealed nothing except moderate anæmia and the leucocytosis which would be expected with a large abscess. The pus from the abscess was also examined for tubercle bacilli, but none were found. As the patient did not raise anything when he coughed, no mucus from the throat could be obtained for examination.

The blood count on August 4, 1900, revealed:

Red corpuscles	4,752,000
White corpuscles	13,400
Hæmoglobin	77 per cent.

[1] We are indebted to Dr. Carl Buttner, of Orange, without whose courteous interest and knowledge of the Hungarian language this history could not have been obtained.

Differential count of leucocytes:

Small mononuclear	7.94 per cent.
Large mononuclear and transitory	12.35 per cent.
Polymorphonuclear	78.80 per cent.
Eosinophiles	.30 per cent.
Myelocytes	.60 per cent.
	99.99 per cent.

The red corpuscles were of average size and shape. There were no nucleated reds, poikilocytes, microcytes, or macrocytes; no malarial organisms in fresh or dried specimens.

The healing of the abscess was markedly tardy. Twice or three times the cavity was opened, more or less grumous material scraped out, and fresh drainage-tubes inserted. As he complained of a good deal of weakness and was troubled with profuse sweats, he was put upon a course of quinine and aromatic sulphuric acid.

On September 22 he was discharged from the hospital, the abscess being only partly healed. On November 18 he was seen again and submitted to careful examination, and the following weights and measures recorded. The abscess had left a sinus, which extended through the anterior axillary wall. The man, however, was able to work, and was supporting himself by his labor. He could move his arm quite freely. His chest was well shaped, and the results of inspection and palpation were negative. On auscultation and percussion the heart and lungs appeared normal, except a little bronchitis, probably subacute, most marked at the right apex posteriorly, where only a few fine râles were heard. The pulse was of good rhythm and tension. No sclerosis of the arteries was observed, and no excessive abdominal respiration. There was a slight dorsal and dorso-lumbar curvature of the spine. The abdomen was not pendulous. Facies not enlarged or elongated; zygomata, inferior maxilla, cheek, nose, chin, tongue, lips, and teeth, normal in size and appearance. His teeth showed moderate Riggs disease in the lower jaw, otherwise their shape, position, and general condition were good. The sterno-cleido-mastoid muscles were large and prominent. The thyroid body was not palpable. The larynx seemed broader than normal (it was seven centimetres in width). The intraclavicular space was well marked. The thymus gland was not palpable. The body muscles were small. The skin was soft, and apparently healthy. Some increase of pigment was noted at

the waistband of his trousers, his shirt-collar, and in the groins and axillæ. The skin of the hands was soft; no fleshy pads observed. There were no tumors or warty growths on the neck or elsewhere. No hyperæsthesia nor anæsthesia was detected in any part of the body. The special senses were normally acute and the knee-jerks normal. His genital organs were well formed and healthy, but rather small. A moderately large scar, apparently from a glandular abscess, was noted in the left Scarpa's space near the saphenous opening; no definite history of its causation could be obtained, nor did the man remember whether it had any connection with the venereal ulcer previously spoken of.

The temperature in the mouth was normal, that of the axilla 97.8° F., and that of the palm 95.2° F. The man's height was five feet nine inches (1.75 metres); weight, one hundred and fifty-seven and one-half pounds (71.44 kilos.). The circumference of his right wrist was eighteen centimetres; of his left, seventeen and one-half centimetres; the right metacarpo-phalangeal circumference measured twenty-two and one-half centimetres; the left, twenty-one and one-half centimetres; the length of right hand was twenty-one centimetres; the left hand, twenty-two centimetres; the circumference of each thumb at base of nail measured seven and one-half centimetres.

	Right hand.	Left hand.
Circumference of first finger at base of nail	6 cm.	6 cm.
Circumference of second finger at base of nail . . .	6.5 cm.	6.8 cm.
Circumference of third finger at base of nail	6.5 cm.	6.3 cm.
Circumference of fourth finger at base of nail . . .	5.8 cm.	5.5 cm.
Circumference of first finger at middle phalanx. . .	5.5 cm.	5.4 cm.
Circumference of second finger at middle phalanx .	5.8 cm.	6 cm.
Circumference of third finger at middle phalanx . .	5.5 cm.	5.4 cm.
Circumference of fourth finger at middle phalanx .	5 cm.	5.3 cm.

Measurements of diameters of finger-nails in centimetres:

	Right hand.		Left hand.	
	Transverse.	Longitudinal.	Transverse.	Longitudinal.
Thumb	2.7	2.5	2.7	2.7
First finger	2.2	2.4	2.2	2.2
Second finger	2.5	2.5	2.5	2.3
Third finger	2.5	2.5	2.5	2.3
Fourth finger	2	2	2	2.7

The little fingers of both hands were somewhat flexed and adducted at the middle phalangeal joints. These joints were somewhat enlarged. No warts or protuberances were noted on the hands.

The following measurements of the feet and legs were taken:

Circumference of right leg at fifteen centimetres above the sole	25.5 cm.
Circumference of right leg at thickest part of ankle	25.5 cm.
Circumference of right leg above tips of malleoli	30 cm.
Circumference of right leg at calf	37.5 cm.

An enlargement (exostosis) of the right tibia seen externally seems to be continuous with the fibula. Both right malleoli were enlarged and thickened. The anterior portion of the foot between these two points was enlarged by (apparently) an increase in the thickness of the bones. The foot was thick and chunky, but not deformed.

Circumference of right foot around metatarsophalangeal joints at great toe	26 cm.
Circumference of right great toe at base of nail	11 cm.
Length of right great toe	8 cm.
Transverse diameter of great-toe nail	4 cm.
Length of right foot	27.5 cm.
Circumference of left leg fifteen centimetres above sole	25.5 cm.
Circumference of left malleoli	30 cm.
Circumference of metatarsophalangeal joint of great toe	26 cm.
Circumference of left great toe at base of nail	10.5 cm.
Length of left great toe	8.2 cm.
Transverse diameter of great-toe nail	3.7 cm.
Longitudinal diameter of great-toe nail	3 cm.
Length of left foot	26.5 cm.

There was an enlargement of the left shin-bone similar to that in the right leg, but not so marked.

The eye-grounds were kindly examined for us by Dr. Wilton D. Garrett, of East Orange, who pronounced them both practically normal. Vision was fair. No pressure symptoms were present; no scotomata; no choked disks.

On November 17 one of us again made a blood count, and found the following improved condition:

Hæmoglobin	90 per cent.
Red corpuscles	5,496,000
White corpuscles	5,330

Differential count of leucocytes:

Small mononuclear	28.4 per cent.
Large mononuclear and transitory	13.2 per cent.
Polymorphonuclear	55.6 per cent.
Eosinophiles	2.8 per cent.

No microcytes, no macrocytes, no poikilocytes.

On December 5 the urine was examined chemically, quantitatively, and microscopically, and found to be normal. The man's condition was gradually improving, and by the latter part of December the sinus in the right anterior axillary wall had completely closed.

The fingers and toes remained the same. It should have been stated that the base of the nail lay above the level of the knuckle, so that its outline could be discerned beneath the skin. It was movable, and had the peculiar semi-fluctuating property spoken of in the literature. The texture of the nail seemed healthy, although some tendency to split or fissure longitudinally was noted. There was no pain on manipulation. There were marked transverse striæ, especially of the thumb-nails, and the curvature was both lateral and longitudinal (parrot-beak clubbing). When the nail was pressed upon at either end, it would rock up and down as though fastened only at its centre. The man declares that the tips and nails of his fingers and toes have always been in the same proportion to his hands and feet that they are now, and that they have never pained him nor kept him from work. He does not seem to be aware of the enlargement of the distal extremities of his long bones nor of his spinal curvature, and can give no history of these abnormalities. He is not a man of much intelligence, although his story has been told to a number of questioners without marked variation. He can write legibly, and is making good progress in acquiring the English language. His assertion that his brother and child have the large nails is proved by the photographs (Figs. 1, 2, and 7).[1]

The mother has noticed in their child, aged four, whom we first saw in an acute attack of endocarditis, a tendency to have blue fingers, toes, and ears since birth. In February, 1900, the bulbous fingers and toes were in the same condition as now. Bruit with systole most noticeable at base; rapid pulse; dyspnœa much increased on exertion; elevation of temperature, etc., for three weeks, then gradual convalescence up to the present condition. The child cannot ascend stairs or even play hard, and becomes blue on the slightest

[1] Our thanks are due to Dr. Harvey, of Orange, for several excellent skiagraphs, and to Dr. Halsey, of Montclair, for some photographs of this patient's hands and feet. Dr. Harvey has also put us under obligation by two careful physical examinations of the chest.

FIG. 5.—Skiagraph of index-finger of a case of osteo-arthropathy.

FIG. 6.—Skiagraph of index-finger of a case of phthisis.

FIG. 7.—Larger-sized picture of hand seen in Fig. 2.

excitement. There is neither cardiac hypertrophy nor dilatation; only loud systolic bruit; the second sound is normal.

So far as we can learn, there have been up to this time seven cases of pulmonary osteo-arthropathy reported in America,—one by Packard, one by N. S. Davis, four by W. S. Thayer, and one by Hasbrouck. Ours makes the eighth. Thayer in 1898 placed the total number of undoubted cases so far reported in this country and abroad at fifty-five. Of these twenty were examined post mortem, and in eleven the condition of the bones was satisfactorily recorded. In all these cases there was an ossifying periostitis, limited almost entirely to the diaphyses of the long bones of the hands, feet, arms, and legs, and most marked at their distal extremities. Once the skull was thickened. The ribs and the rest of the skeleton seem to have been unaffected. The periosteum of the affected bones is thickened, and in some cases new bone is laid on more or less regularly in layers, in others in an irregular and warty manner. Many erosions of the joint-cartilages were noted together, with an excess of fluid in the joints. The skin is practically unaffected. Dr. Thayer continues: "The clubbing of the fingers does not depend upon bony changes, the terminal phalanges having been always unchanged." (See accompanying skiagraph of the index-finger of our case, Fig. 5); Fig. 6 represents a phthisical index-finger for comparison. We also desire to call attention to the practically unaltered condition of the bones of the hand. These slight increases of bony tissue, being so much less than those observed in other cases, lead us to infer that the morbid process in our case ceased, or practically so, before extensive deformities occurred. The change underlying the clubbed fingers seems to have been in the main vascular. Freytag described a dilatation of the papillary processes in osteo-arthropathy, but no other cutaneous alteration. No sclerosis of the corium, nor of the subcutaneous tissues was noted.

As to the etiology of the condition, all the theories so far advanced have this in common, that they utterly fail to account for the extreme rarity of the so-called disease. Thayer and others compare the process to amyloid degeneration, which in certain unexplained conditions follows or accompanies protracted suppuration. It may occur in syphilis and sometimes appears without assignable cause. In like manner clubbed fingers may accompany or follow a number of conditions, generally suppurative diseases of the bronchi,

lungs, or pleuræ, and may occur in heart disease, and in healthy people, from no discernible cause. Godlee and others have recorded such cases. However, when these are accompanied, as in our case, by spinal curvature and enlargements of the extremities of the long bones, it is a case of so-called pulmonary osteo-arthropathy. This, in our patient at least, seems to have an hereditary or family history, and in his person it seemed to accompany, or be dependent upon, a tendency (constitutional or acquired) to prolonged suppuration (observe that an axillary abscess took five months to heal). This is in accord with the opinion of some of the best authorities, that suppuration has an etiological relation to the condition. Yet in J. T.'s case it could hardly have resulted from suppuration in his own body, since he firmly believed that he was born with the big fingers, and that in his children and his brother they were congenital, and apparently permanent, and had always been in the same proportion to the hands and feet. Of course the statement of an Hungarian peasant must be taken with some reserve, but, as said before, cross-examination did not impair the man's testimony.

Dr. Thayer gives the antecedent disease known to have been present in forty-three of the fifty-five cases which he has collected as follows: pulmonary tuberculosis, nine cases; empyema, nine; pleurisy, five; bronchitis, with or without bronchiectasis, fourteen; sarcoma of lung, two; abscess of lung, two; carcinoma of pleura with effusion, one case; acute pneumonia, one; total, forty-three cases. Of the remaining twelve cases, the antecedent condition was: syphilis, three cases; valvular heart disease, three; chronic diarrhœa, two; spinal caries, one case; unknown causes, three cases.

We must admit that with a family history of pulmonary disease on the father's side and with a probability that J. T. acquired syphilis thirteen years ago, added to the fact that his children seem to have been short-lived and his rejection for the Hungarian army, he cannot be said to be free from constitutional dyscrasiæ. But—and this to our mind is the most striking thing in the peculiar condition that we are considering—why are not more cases of osteo-arthropathy observed among the millions of people who have tubercular and syphilitic histories? We cannot avoid the conclusion that this abnormality must depend upon an etiological factor which has so far escaped detection, and that it may be nutritional or regional, like goitre. The occurrence of the enlarged nails in so many mem-

bers of J. T.'s family leads us to suspect that this family was subjected to some condition of climate, soil, or drinking-water which led to the development of the deformity among them.

The observations of Legrain, quoted by Walters, which do not seem to have attracted a great deal of notice, are, to our minds at least, interesting and worthy of study, inasmuch as they bear upon a condition or disease which may be said to have baffled all inquirers into its etiology. Legrain says that the bones in osteo-arthropathy have an undue proportion of magnesia with diminution of the lime, and he attributes this fact to the drinking-waters, especially in the desert of Sahara, where he had observed a number of cases of osteo-arthropathy, which he asserts were unconnected with any bronchial or pulmonary lesion. He further claims to have strengthened this assumption by experiments upon animals. It is known that feeding hens upon phosphorus will produce a condition resembling pulmonary osteo-arthropathy. Whether this results from the introduction of a toxin into the system or from an interference with nutrition has, so far as we know, not been determined. According to our view, a vicious or defective nutrition seems to be the cause of this abnormality. But we must admit that this hypothesis shares in the objection, which we have advanced against the other theories,—to wit, it fails to explain the extreme rarity of the condition.

It is needless to give the differential diagnosis between acromegaly and osteo-arthropathy, which we believe is sufficiently well known. We earnestly hope that the present meagre knowledge of the pathology of the latter condition (for we are strongly inclined to call it a condition, and not a disease) will shortly be so reinforced and amplified that the etiology will not remain so much of a mystery.

In closing, we join with others in deploring the clumsy name which the condition has received, based upon the premature assumption that there is always an antecedent pulmonary disease. Dropping the word pulmonary from the title and calling the condition osteo-arthropathy would, in our opinion, be a decided improvement, as at least not misleading, albeit rather vague.

We append a bibliography, supplementary to that of Walters, which extended to 1895; ours gives what references we have been able to obtain from the beginning of that year to March, 1901.

BIBLIOGRAPHY.

Springthorpe, Brit. Med. Journ., 1895, vol. i. p. 1257.

Walters, St. Thomas's Hosp. Rep., 1825, vol. xxiv. pp. 50, 105.

Davis, Journ. Am. Med. Assoc., 1895, xxiv. p. 845.

Walters, Brit. Med. Journ., 1896, vol. i. p. 329.

Lockwood, Trans. Cl. Soc., 1896, vol. xxx. p. 133.

Thayer, N. Y. Med. Journ., 1896, p. 33.

Thorburn and Westmacott, Path. Soc. Trans., 1896, p. 177.

Godlee, Brit. Med. Journ., 1896, July 11, p. 57, July 18, p. 116, Nov. 7, p. 1417.

Tournier, Rev. de Méd., 1897, xvii. 221.

Massalonga, Il Policlino, 1897, p. 572.

Teleky, Wiener klin. Wochen., 1897, No. 6, p. 143.

Thayer, Phila. Med. Journ., 1898, vol. ii. p. 955.

Hasbrouck, N. Y. Med. Journ., 1898, pp. 67, 655.

Sonneville, Echo méd. du Nord, 1898, vol. ii. p. 610.

O'Carroll, Trans. Royal Acad. Med., Ireland, 1898, vol. xvi. p. 318.

Whitman, Pediatrics N. Y. and Lond., 1899, vol. vii. p. 154.

Gasne (rare case), Deutsche Chirurgie, 1898, vol. l. p. 28; Rev. Neurol., 1900 vol. viii. p. 539; or N. iconoq. de la Salpêtrière, 1900, vol. xiii. p. 404.

TOTAL APHASIA; ITS DIAGNOSTIC SIGNIFICANCE FOR THE DETERMINATION OF CEREBRAL AFFECTIONS.

CLINICAL LECTURE DELIVERED AT THE GERMAN UNIVERSITY OF PRAGUE, AUSTRIA.

BY PROFESSOR ARNOLD PICK,

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GENTLEMEN,—In a previous clinic[1] I called your attention to the significance which the cerebral localization of a lesion may have in enabling us to determine its pathological character. I showed that localizing diagnosis might prove a suggestive indication for the treatment of the condition and a source of valuable hints for the prognosis of the case, and that our determination of the existence of a widespread pathological condition at the base of the brain led us under certain circumstances to the sure determination of the existence of brain syphilis. I now show you a case in which the determination of the cerebral localization of the lesion will at once lead us to similarly indubitable conclusion with regard to the character of the pathological condition that is present.

The patient before you is, according to the history which we obtain from his wife, a mason forty-five years of age. She is his second wife, and as such knows nothing of his previous history except that which has happened during their thirteen years of married life. About three weeks after his marriage he suddenly lost consciousness one day while at work. He was carried, while unconscious, to a neighboring hospital, which, however, he was able and was permitted to leave the next day. Since then there have been similar attacks at intervals of two or three years. His wife has noticed that in the course of these years difficulty of speech has occurred, always worse after an attack, and this speech disturbance has become more noticeable as the attacks have multiplied. It seems to have been a dysarthria, a difficulty of articulation that made it hard to understand him.

[1] See INTERNATIONAL CLINICS for October, 1901, p. 149.

For years the patient has complained of severe headache. His wife has had six conceptions, but has aborted five times. One child was born at term, but it is distinctly lacking in intelligence. About five months ago the patient suffered from an apoplectic seizure during the night. Of this attack his wife was able to tell us only that in the early morning, after waking about the usual hour, the patient by signs gave her to understand that he could not talk, and that besides he was not able to move his extremities on the right side. Since then he has been in various hospitals, but without any change taking place in his condition.

As can easily be understood, the patient himself is not in a condition to complete the history that we have obtained. We must simply make an examination to determine what his physical condition is. It is not hard to decide that he has the symptoms of a typical right-sided hemiplegia, also a right-sided paresis of the facial muscles, especially in the neighborhood of the mouth, which is displaced towards the left. When asked to protrude his tongue, he seems to understand what is wanted of him, but does not project it very far: he seems to have lost power over it to some extent. The uvula hangs towards the left. The right arm and right hand show the typical position of contracture; the right leg is also affected in the same way. The power in his right hand as measured by a manometer is zero. An attempt to stretch the right leg and straighten the knee-joint brings on sympathetic movements in the left arm. His gait corresponds to that of organic hemiplegia. His sensation on the right side is somewhat diminished. His sense of position and his stereognostic sense—that is, his power to recognize objects by the sense of touch—cannot be satisfactorily tested. His knee-jerks are increased on both sides, especially on the right. There is no ankle-clonus. There is a hint of periosteal reflex on the left; on the right it is lively. The triceps-tendon reflex is present on the left and is increased on the right.

The eye-grounds are perfectly normal. There are no pathological conditions in the external visual apparatus. His condition makes it extremely difficult to determine his field of vision. Repeated attempts have been made to secure some information in this way, and the impression obtained from them was that right-sided hemianopsia was present.

With regard to the physical condition of the rest of his body,

it is to be noted that the heart dulness is larger than normal and that the first sound of the mitral valve is somewhat impure, though there is scarcely a distinct murmur present. He has to be fed and does not chew his food, but swallows it as soon as it is placed in his mouth. He is physically unclean and suffers from incontinence of urine and fæces. He is extremely sensitive and sheds tears as soon as he is spoken to harshly.

With regard to his aphasia we find that his command of words is very limited. There are two words, "Yes" and "No," that he uses, though they are frequently employed in combination, as "Nyes" ("Nein-ja," German) or "Yes-no." There is a sound like "Smicha" that he employs frequently; this is almost the same sound as his own name. "Yes" and "No" are not employed with any true significance of their distinctive meaning. Our tests, then, would seem to show that there is no spontaneous speech.

There is some faculty for imitative speech. When a question is asked that consists of a single phrase of two or three words, he echoes it. For example, "What's your name?" "Your name." "Take hold of your nose." "Your nose." Occasionally, as a distinct surprise, in the midst of his limitation of speech, when a question is asked, he uses a series of words that have some sense. Once while here in the clinic, when his name was written on the board before him and he was asked what it was, he replied, "The Three Holy Kings." Once when he was asked how old he was, he replied, "I am forty-five." This was the single instance of correct connection between question and answer and seems to have been scarcely more than an accident.

With his defective power of expression the patient is, as you can well understand, not able to name objects that are presented to him. The acoustic word-pictures of objects he is, however, evidently still capable of understanding. When a number of objects are placed before him and the names of single ones are mentioned, he is able to pick out those referred to.

It is impossible to induce him to sing, or, at least, we have not been able to make him understand that we wanted him to do so. Single words he seems to comprehend occasionally. Short phrases often seem to convey an idea to him. Of longer series of words he evidently misses the meaning entirely. When I ask him, for instance, "What is your name?" he looks at me blankly. When

I repeat the question several times, especially if I raise my voice at all, he weeps. When I call him by his name, "Frank," he does not answer. I ask him, "Have you had a stroke?" He answers, "Ja." I ask him to show me his teeth. He opens his mouth. I ask him, "Can you write?" "Ja." "With which hand?" He points to the left. "Where are your eyes?" He shakes his head; does not understand. "Which leg is paralyzed?" He does not understand. "I will lock you up." He says, "Nein-ja;" he does not agree with me. I ask, "Do you deserve to be punished?" He says, "Nein-ja" and shakes his head. "Touch your nose with your hand." He looks at his hand. "Give me your hand." He does so. "Stand up." He does so. I request him to point out objects before him. "Where is the watch?" He points to it. "Where is the key?" He touches the pencil. "Where is the pen?" He touches the watch. It should be remarked here that his power of comprehending speech varies, being sometimes better, sometimes worse.

It is difficult to test the voluntary repetition of speech in his case, since it is very hard to make him understand what is wanted. It is easy, however, to show that he can repeat such questions as "How old are you?"

He is utterly unable to read. You can see that he cannot understand anything in the paper. He fails just as signally to read writing. Neither can he express himself in writing. When you put a pencil into his left hand and make him understand, as far as possible, that you want him to copy something set before him, he brings himself in position to write, but makes only some meaningless and irregular pencil-strokes. When a song is sung in his hearing, there is no sign that he understands its meaning.

When we bring together all that we have found with regard to the speech disturbance in our patient's case, we find that all that portion of the speech faculty which deals with expression, with the exception of some few syllables, is destroyed or seriously hampered. The condition present corresponds to what we know as cortical motor aphasia. Further we are able to demonstrate that the impression portion of his speech faculty, which in pure motor aphasia is usually essentially intact or only indirectly affected, is in this case almost as much disturbed as is the faculty of expression. This disturbance involves the acoustic as well as the optic

elements of the speech faculty, so that we must diagnose the existence in the case of a cortical sensory aphasia as well as the motor aphasia. The clinical distinction between these two forms of aphasia, as far as we know it, consists in the fact that sensory aphasia disappears more rapidly than motor aphasia and that sensory aphasia usually corresponds to the peculiar symptom known as echolalia.

With this form of aphasia, sensory aphasia besides echolalia, it is possible to have the spontaneous articulation of one or more words, or even phrases, whose significance and employment are evidently not quite intended. It is not an unusual thing in motor aphasia that the patient retains the power spontaneously to use

FIG. 1.

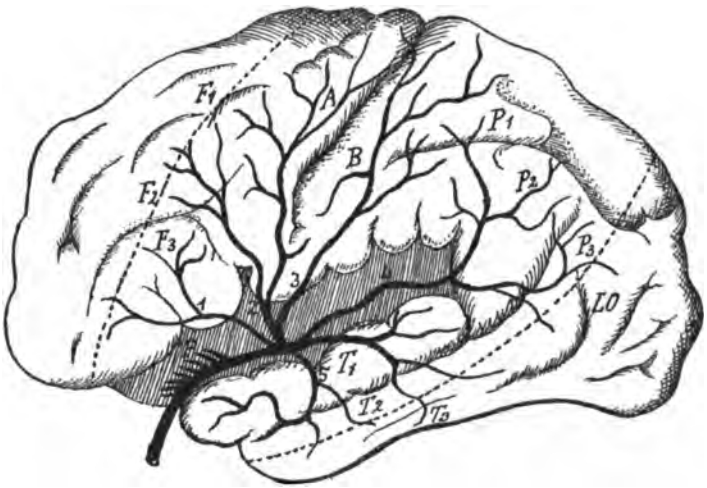


Diagram of cerebral vessels, showing speech area supplied by arteria fossæ Sylvii.

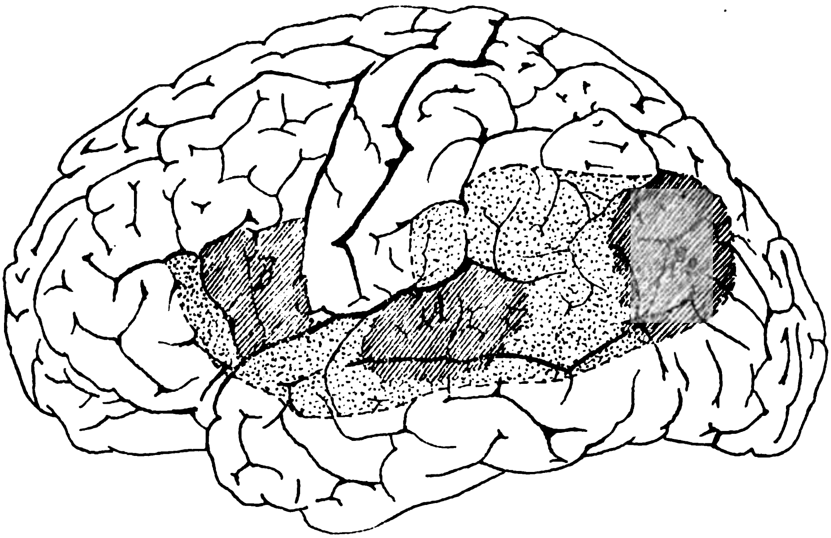
some curse, or some other ejaculation, though he may not be able to use it at will and at a moment when it would be really significant.

There is here, then, a combination of the two basic forms of aphasia, which, as a rule, make their appearance entirely independent of each other. Our case presents the symptom complex which involves the expressive as well as the impressive part of the faculty of speech, and that has been well called—since it practically entirely obliterates this faculty—total aphasia.

To determine the localization of the lesion in this case we may at once assume that this total aphasia is due to a simultaneous

disturbance of both the cerebral territories, either one of which is involved when motor or sensory aphasia is present alone. If we ask ourselves how can total aphasia occur as a consequence of an apoplectic stroke, we must first consider the relation which the cerebral vessels bear to the brain. A glance at Fig. 1 (Duret's well-known diagram of the cerebral vessels) shows that the cortical area for speech, the total disturbance of which would lead to the occurrence of combined motor and sensory aphasia, is entirely supplied by the arteria fossæ Sylvii. To make this clear I show you a diagram (Fig. 2), borrowed from Dejerine's recent work,

FIG. 2.



The cortical speech area (Dejerine).

that presents the speech-area in all its completeness. If, then, the arteria fossæ Sylvii of the left hemisphere should become closed by a thrombus or an embolus near its origin, softening of the brain would take place in all the region supplied by the artery. In this case the aphasia would also be accompanied by hemiplegia, because, besides the speech-centres, the anterior and posterior central convolutions (in English usually called the ascending frontal and ascending parietal convolutions) would be included in the softening process, since, as can be seen from Fig. 1, they too are supplied with blood by branches of the arteria fossæ Sylvii.

It is comparatively rare, however, to find an embolus in this

artery. It would be unreasonable to assume the occurrence of embolism where there is no adequate source of embolus. There is a slight heart murmur in the case and perhaps a heart lesion, but this is certainly not of such a character that we would look for emboli to be shot off from it into the brain. This consideration would practically exclude the diagnosis embolism. It seems very probable, then, that the symptom complex, total aphasia, as it exists in the present case, is due rather to a thrombosis of the arteria fossæ Sylvii.

The history of the case shows that the symptoms developed suddenly and all of them at the same time. This points to thrombosis of the artery and also gives a hint as to its cause. When thrombosis occurs in a comparatively young person, there is great probability that it is due to the existence of a syphilitic vascular affection. When corresponding symptoms develop in an older person, as a rule, we think only of atheromatous degeneration of the involved arteries. Of course, patients young in years may be precociously old in their arterial systems, and so at times even in people scarcely beyond middle age atheromatous degeneration of arteries may occur and be followed by thrombosis.

If we return to our case now and endeavor to substantiate our diagnosis of syphilitic thrombosis, we find in the personal history certain hints that point to the existence of this disease and that confirm our conclusion that the thrombosis of the arteria fossæ Sylvii was due to a syphilitic process. The most important thing in the previous history of his ailment is the occurrence of repeated slight apoplectiform attacks. These would seem surely to have been due to limited thrombotic lesions and consequent softening. What the localization of these small lesions may have been we can scarcely guess, since all the facts necessary to such a diagnosis are lacking. With regard to the spread of the area of softening which occurred as a consequence of the thrombosis of the arteria fossæ Sylvii, all the symptoms in the case justify us in thinking that the softening process affected not only the whole speech-area, but also the greater part of the central convolutions,—that is the ascending frontal and ascending parietal convolutions.

Practically all the authorities are agreed that a total aphasia developing as in the present case is always of syphilitic thrombotic origin. I would call your attention, however, to the possibility

of such an aphasia developing under other circumstances, the clinical history of the case being the diagnostic aid for differentiation. If we review on theoretic grounds the processes that might follow an acute apoplexy so as to produce disturbance of the entire speech-area, we cannot fail to recall that an extravasation of blood gradually coming to exert pressure on the entire convexity of the cerebral hemisphere might have such a result. For instance, a hæmatoma of the dura mater might easily cause total aphasia. The same effect might follow from an internal hemorrhagic pachymeningitis. Total aphasia that does not develop acutely may result from the growth of a tumor. In this case, however, the possibility of any confusion in the differential diagnosis between tumor and softening in the speech-area is removed by study of the history of the case.

These possibilities are not merely theoretic. In 1878, while working with Kahler, I published one of these rare cases in which the symptoms were what we now call total aphasia accompanied by hemiplegia. A long while afterwards we had the opportunity to make an autopsy, and we found an extensive internal hemorrhagic pachymeningitis covering almost the entire left cerebral hemisphere. Acute trauma may cause extensive hemorrhage into the sac of the dura mater and so bring on the symptom complex of total aphasia and hemiplegia as we see it here. In such a case, however, the diagnosis of the condition present will immediately suggest itself and the question of surgical interference will be at once made clear.

In the description of the case I intentionally emphasized the fact that total aphasia, when due to thrombosis of the main stem of the arteria fossæ Sylvii, always occurs suddenly and completely. The question then arises, how would we be able to diagnose between total aphasia caused by such a thrombus and a suddenly developed hæmatoma of the dura mater? As is well known, hæmatomata of the dura mater usually occur in alcoholic patients and are often spontaneous, but may be due to very slight trauma. Such patients are especially liable to head injuries, because of their frequent falls, so that the question is of considerable practical importance. If the physician is called in time, there will usually be no difficulty in deciding which of the two conditions is present. The symptoms due to hæmatoma gradually grow worse and worse, increasing not only in number but also in intensity, and the physi-

cian sees the complete symptomatic picture developing under his eye. The parts of the body become more and more hemiplegic and the speech disturbance becomes more marked. The blood oozes more and more into the dural sac and causes pressure on more and more of the brain. We have lately had such a case under observation.

Now that we have diagnosed the localization of the lesion in this case and also the character of the affection that is present, it remains for us to decide as to the prognosis, which may be regarded from two points of view,—first, how far do such cases as this one permit us to think of a possible improvement of the symptoms? and, secondly, what is our prognosis as to the influence of the pathological condition present upon the other parts of the brain which are not as yet affected? Of course, in this matter of prognosis we must take into account how much our therapeutic efforts are likely to be of avail in rendering the pathological condition less serious and stopping the softening process in the cerebral tissue.

As regards the first question I must say very decidedly, on the strength of my own experience as well as my knowledge of similar cases in medical literature, that when total aphasia is as complete as it is here no improvement can be looked for. Cases of total aphasia in which either the sensory or the motor disorder cannot be considered as the result of compression produced by a distant lesion are not capable of more than very slight improvement. If the sensory and motor disturbances are not the direct effect of a pathological condition in the speech-area itself, improvement in either one soon sets in, giving us the ultimate prognosis of the case.

As a rule, when total aphasia has lasted for more than six weeks the symptoms will continue to persist for a long time and probably will remain permanently. Any material improvement, even with the employment of the newer methods of reteaching the use of speech, is not to be expected. Not only that, but the presence of the lesion on which the total aphasia depends can scarcely fail to have a serious unfavorable effect upon the rest of the brain. The larger the lesion is, especially when it affects the cerebral cortex, the more serious the prognosis. A large number of association nervous fibres are destroyed, and consequent atrophy of brain tissue sets in which leads to increasing mental weakness.

The higher in dignity the psychic element that exists in the affected regions, the more serious is the effect of the presence of a

lesion therein. It can be easily understood, then, without further demonstration, that extensive lesions of the speech-area in the left cerebral hemisphere are especially liable to be productive of harm by their effects upon the rest of the brain. We have a good example of this in the present case, our patient's intelligence having suffered to a great degree. I believe that small lesions in the speech-area of the left hemisphere are as regards prognosis considerably more unfavorable than even large lesions of other parts of the brain. Lesions situated, for instance, in areas of the right hemisphere symmetrical to the speech-area in the left hemisphere are never of as serious prognosis as those on the left.

As to how far properly directed therapeutic measures may be expected to influence favorably the course of a case such as this, it must be said that it depends entirely on the extent and character of the pathological condition present. In our case something may be expected from an energetic antisyphilitic treatment, and yet even this does not promise very much. The softening of the brain has, of course, nothing to do with the syphilis: it is due entirely to the shutting off of the blood-supply. The area of softening will not be affected in the slightest degree by antisyphilitic treatment. Besides, syphilis of the blood-vessels is especially obstinate to such treatment. Experience has taught us that in extensive areas of softening such as this we can expect to do very little good.

AUTOPSY. REPORT MADE AT A LATER LECTURE.

The autopsy in the case of our patient who suffered from total aphasia was made in the Pathological Institute of Professor Chiari by Dr. Peucker, to whom I owe the privilege of showing you the specimens and the accompanying illustrations.

The left cerebral hemisphere shows on its convexity (Fig. 3) an extensive encephalomalacia, or softening of the brain, which extends from the gyrus frontalis infimus back to the middle third of the gyrus occipitalis. Over the region of the softened area the membranes of the brain are thicker, but the brownish-yellow color of the softened parts shines through. Besides this there is no special pathological change to be discerned by the naked eye.

After hardening of the hemispheres in a formol solution, a series of horizontal sections of the left cerebral hemisphere was

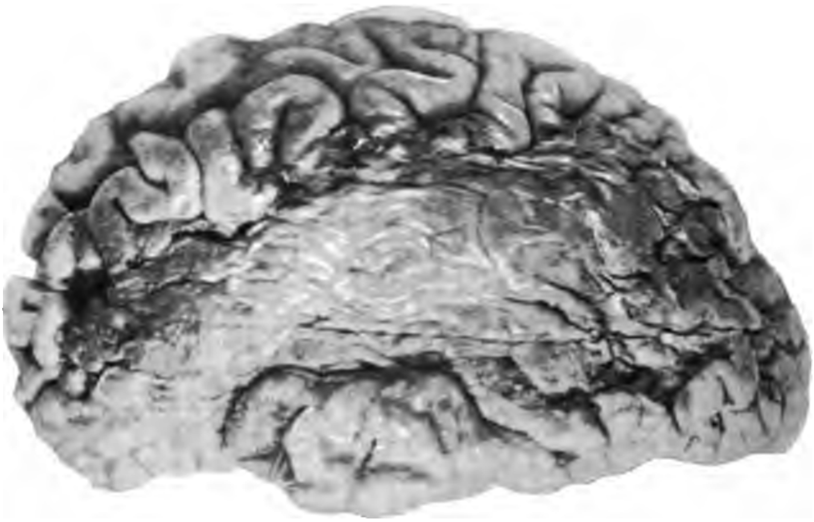


Fig. 3.—Extensive encephalomalacia of left cerebral hemisphere from thrombosis of arteria fossæ sylvii.

Fig. 4.—Horizontal section of left cerebral hemisphere showing extent of internal softening.

made. It was found that the softening not only involved the portions of the cortex mentioned and the neighboring white matter, but had also invaded the island of Reil and had affected the putamen and the head of the nucleus caudatus; limited areas of softening were detected even in the thalamus opticus. In the right cerebral hemisphere a number of small areas of softening (about half the size of a pea) were found. (Fig. 4.) These occurred in the knee of the corpus callosum, to the right of the middle line in the white matter of the gyrus fornicatus, just above the knee of the corpus callosum, in the anterior angle of the internal capsule at its upper edge, in the thalamus opticus, somewhat anterior to the middle in the white matter of the third temporal convolution, in the wall of the lateral ventricle, somewhat above the middle of the lamina striata cornea, in the white matter of the posterior end of the second temporal convolution, and in the white matter of the occipital lobe, in the cerebellum, in the pons, and in the medulla oblongata. Careful preparations of the cerebral arteries at the base of the brain disclose the existence of severe and extensive endarteritis chronica deformans. Besides there was here endarteritic obliteration of some of the end branches of the Sylvian artery.

Very little explanation of the autopsy findings is needed. The speech-area was especially affected. The area of softening is exactly that which would have occurred if there had been thrombosis of the trunk of the arteria fossæ Sylvii. Only one circumstance seems to demand discussion. Contrary to our expectations, the whole region of the central convolutions—that is, of the ascending frontal and parietal convolutions—was not affected. Only the lower third of this region was involved in the softening process, in spite of which the hemiplegia was complete. The reason for the complete hemiplegia was the presence of areas of softening in the basal ganglia of this hemisphere, some of which were visibly in relation to the fibres at the inner capsule.

A very simple consideration shows that these small areas of softening were also etiologically connected with the thrombosis of the arteria fossæ Sylvii. It is well understood that when a syphilitic basal meningitis exists as a consequence of syphilitic arteritis in the important arteries at the base of the brain, the branches of these arteries also become affected. The perpendicularly ascending branches which supply the basal ganglia and the ascending part

of the inner capsule are supplied by terminal arteries. The existence of syphilitic endarteritis in these arteries leads to the production of areas of softening, usually not large, but sufficient because of their special location to produce hemiplegia.

We must conclude that in our case, either at the same time or more probably (as you will recall from the history) in two or more successive attacks, the thrombosis of the two arterial regions under consideration occurred. As a result of the combination of these two sets of thromboses, the clinical symptoms pointed rather to the existence of a thrombosis of the whole region supplied by the arteria fossæ Sylvii; as is well known, the diagnostic rule is to account for all the symptoms present by as few lesions as seem necessary and if possible by a single lesion.

With reference to the extension of the area of softening into the occipital lobe, you will remember that we thought we discovered in our patient certain symptoms that pointed to the existence of a right-sided hemianopsia. The finding at the autopsy, then, of a lesion of the occipital lobes must manifestly be regarded as a sufficient basis for this presumed hemianopsia, especially as we are able to note that in the horizontal sections of the hemispheres the area of softening extends also into the white matter of the occipital lobe and so must surely have caused serious interference in the optic tracts. The decision of this question, however, must be left until the more complete microscopic examination of the brain.

It is not surprising that the multiple small areas of softening in the right hemisphere escaped our diagnosis. The main reason for this was the utter helplessness of the patient, especially his complete aphasia and the consequent impossibility of making a satisfactory examination or obtaining any information from his answers. Another reason, of course, is that the situation of these areas of softening, apart from their smallness, would of itself have been practically sufficient to preclude the possibility of a localizing diagnosis. One symptom might have led us to suspect the existence of some pathological condition on the right side; this was the persistent impossibility for the patient to put out his tongue.

It will be interesting to note, in connection with our clinical diagnosis of the presence of a heart lesion, that we found hypertrophy of the left ventricle, but absolutely unimpaired heart-valves.

Surgery

THE OPERATIVE RELIEF OF SOME FORMS OF PROSTATIC HYPERTROPHY.

A CLINICAL LECTURE DELIVERED AT THE NEW YORK MEDICAL HOSPITAL.

BY CHARLES H. CHETWOOD, M.D.,

Professor of Genito-Urinary Surgery in the New York Polyclinic Medical School and Hospital; Visiting Surgeon to Bellevue Hospital, etc.

GENTLEMEN,—The prostate gland, as you know, is located anterior to the neck of the bladder, its apex being behind the triangular ligament. Its size is somewhat variable, even under normal conditions. It usually measures about one and a half inches in the anteroposterior direction, one and three-quarters inches in breadth at its base, and about seven-eighths of an inch in thickness. In the morbid condition commonly occurring late in life—senile hypertrophy, an example of which I have brought here to-day for operation—this organ becomes two or three times its normal dimensions, and occasionally it attains an enormous size. The prostate is composed of glandular, muscular, and connective-tissue elements. Its morbid enlargement is due to augmentation of all the normal elements, but particularly the glandular. The prostatic portion of the urethral canal is about one and a quarter inches long. This measurement is an important matter to remember, since an increase in the length of the prostatic urethra indicates, approximately, a like increase in the anteroposterior dimension of the gland, and this is one of the points to be noted in the examination of the patient.

In conducting such an examination the gland is first approached by a digital exploration *per rectum,* which step is of great importance. The prostate is felt just inside of the rectum, and the finger will appreciate any increase in its lateral or anteroposterior diameter, and will also recognize any inequalities of the surface, as well as the consistency of the gland. In the normal condition the pros-

tate presents only a slight elevation in the rectum, with a flattened surface rounded off and a sulcus marking the division between the two lobes. Its consistency is somewhat elastic. In the morbid state it may be soft and succulent from congestion, or hard and schirrus-like from fibrous infiltration. It may be irregular in contour, or evenly enlarged with smooth surface, or nodular. The rectal touch will not reveal any intravesical enlargement. This must be investigated by the next step in the examination.

The patient is first instructed to empty his bladder as completely as possible. A clean soft-rubber catheter is then introduced, when it should be carefully observed at what distance from the meatus urine is obtained; by noting this measurement when the catheter is withdrawn the so-called "urethral length" is determined. This is normally from seven and three-quarters to eight and a quarter inches. If there be much anteroposterior enlargement of the prostate, the urethral length will be increased to eight and a half or nine and a half inches, according to the extent of the hypertrophy. Before removing the catheter the urine is drawn off and measured. The amount thus obtained represents the "residual urine,"—that which the patient is unable to pass voluntarily, on account of the obstruction at the urethral orifice of the bladder in some of the various forms of prostatic enlargement. Having emptied the bladder, it is washed out with a mild antiseptic solution, from four to six ounces of which are left inside, and the catheter is withdrawn. A Thompson searcher, which is a short-beaked metallic instrument, is then introduced for the purpose of exploring the cavity of the bladder for the presence of calculi, and, at the same time, an attempt is made to ascertain the nature and extent of the intravesical prostatic growth, whether it be a median lobe or bar, a lateral or a bilateral enlargement.

During the examination the patient is questioned with regard to any existing cystitis, which gives rise to the subjective symptoms complained of,—that is, the frequency of the urinary call, the urgency thereof, and the pain before, during, and after the act. This train of symptoms varies in intensity with the degree of inflammation in the bladder, the congestion of the prostate, and the extent to which such congestion interferes with bladder drainage. A patient with beginning hypertrophy will generally rise once or twice a night for the purpose of passing water, and will become so

habituated to this that it makes no particular impression upon him. It is only when congestion of the already enlarged gland or an infection of the bladder occurs that the inflammation becomes intense and he is led to seek surgical aid, at which time he is generally suffering from an acute attack of retention of urine, from great frequency and urgency of urination, or from a more or less continuous dribbling which necessitates the wearing of a rubber urinal.

When the patient comes with an already infected bladder, with purulent and possibly ammoniacal urine, the examination just described may be carried on with impunity and with little risk; but the greatest caution should be observed when the subject appears with his first attack of acute retention, never having had an instrument introduced into his bladder. At such a time he is particularly prone to infection, and all instrumentation should be conducted with the greatest care and cleanliness, or an acute infection will result, for which the surgeon may hold himself responsible. When the bladder of a prostatic has become infected and he is compelled to urinate with greatly increased frequency, this symptom of irritability is generally more pronounced by night and less by day, while just the reverse is true in cases of vesical calculi; this is a point to be noted in the differential diagnosis between the two maladies.

Let us now make with the patient at hand a practical application of the method of examination just outlined.

General History.—This man, J. E., aged sixty-five, for the past ten years has been compelled to rise once or twice a night to void urine. Two years ago he entered one of the principal city hospitals, suffering from complete retention, and was submitted to regular catheterization for four or five days thereafter. At this time the operation of double vasectomy was performed. After the acute symptoms subsided he left the hospital. The improvement in his condition probably resulted as much from rest and regular catheterization as from the double ligation of the vasa deferentia. At present he is compelled to rise once or twice at night, and by day he urinates every two or three hours. He passes a woven silk catheter every morning to empty the bladder, as after the night's accumulation he is unable to pass water except in very small quantity. The urine is purulent and malodorous (ammoniacal).

With a finger in the rectum we find the prostate symmetrically enlarged to about three times its natural size. The urethral length

is eight inches. There are four ounces of residual ammoniacal urine which the patient is unable to void. By the introduction of the Thompson searcher the presence of calculus is excluded, and by rotating this instrument from side to side and turning its beak completely towards the bas-fond of the bladder, I conclude that there exist a moderate bilateral prostatic enlargement and an elevation of the posterior fold of the orifice of the bladder on account of a third prostatic lobe, or a hypertrophied bar from the posterior isthmus of the prostate.

Having established the fact that a man is suffering from hypertrophy of the prostate, the question of the best means of relief is in order; and a conservative surgeon will endeavor first to relieve the symptoms by instituting bladder drainage, by the aid of the catheter, in the use and care of which the patient is properly instructed. Many prostatics do not require treatment of any kind. There are some cases in which the gland enlarges towards the rectum without encroaching upon the urethral orifice of the bladder; while a prostate which is only moderately enlarged, but in such a way as to impede vesical drainage, may produce the same symptoms as one which is four or five times its natural size.

A patient with prostatic hypertrophy is operated upon because palliative measures fail to relieve the subjective symptoms; because the continuous use of a catheter increases the irritability and is not well tolerated; because the intravesical growth of the prostate renders use of the catheter difficult; or because there is evidence of a beginning pyelonephritis, the result of an ascending infection from the bladder, such as is likely to occur where there is a residuum of persistently ammoniacal urine. These are reasons for submitting a patient to such surgical interference as will promise him more relief than milder measures have succeeded in obtaining. This man has persistently ammoniacal urine, in spite of medication; he is dissatisfied with his present state, which requires daily resort to the catheter, and hopes to be relieved of this necessity. His kidneys should certainly be benefited by the removal of the obstacle at the neck of the bladder, and, therefore, the operation is justifiable.

In choosing an operation for this condition, it is only necessary to remember that what is required is the removal of that portion of the prostate which obstructs the urethral orifice and a restoration to the bladder of the ability to empty itself properly. The result

FIG. 2.—Hypertrophy of the prostate. *a*, median fold.

will be an abatement of the inflammation in the bladder, the removal of a menace to the kidneys, and often a subsidence of an inflammation already beginning in these organs.

There are two ways to accomplish the object desired. One is by complete abstraction of the prostate gland—prostatectomy—and the other by removal only of that portion of the gland which by obstructing interferes with urination. In some cases the prostatic enlargement is of such a nature and so extensive that prostatectomy, or enucleation of the hypertrophied tissue, may be the operation of choice. But in a large percentage of cases the growth is such that complete extirpation is not called for, and the object of operation may be better attained by single or multiple incision of the obstructing and hypertrophied area through a perineal opening to the bladder with the galvanocautery. This is the method which I prefer in many cases, and to the development and introduction of which my efforts have been largely devoted for some time past. This method, I believe, retains all the advantages of the so-called Bottini galvanocautery operation, and is more surgical, more precise, and more certain in its results.

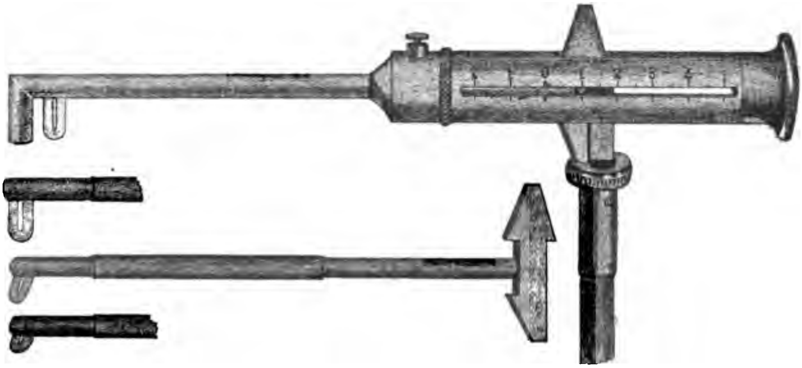
Soon after Bottini's operation was introduced, some twenty-five years ago, it was discarded by almost every surgeon of note, because it was deemed unsurgical, there being no provision for bladder drainage after it, and because of its uncertainty, being done in the dark and not under the eye or touch of the operator, so that the extent of the growth and the result of the operation could not be accurately determined. Of late years a few genito-urinary surgeons have again taken up this method, as they recognize in many cases of moderate prostatic enlargement the futility and unnecessary risk of complete extirpation of the gland, and believe that an incision made through an obstructing prostate with the galvanocautery will produce less hemorrhage than one made with the knife, and that such an incision should leave a permanent groove.

For a long time past I have determined in my own mind that incision by the galvanocautery is the proper method of attacking many enlargements of the prostate, but that it should be combined with perineal incision, to afford proper exploration, precise and complete work, and bladder drainage afterwards; and it is the combination of these two features—incision by the galvanocautery and perineal drainage—which constitutes the operation that I have en-

deavored to develop, for the performance of which the special instrument I here exhibit has been designed. (Fig. 1.)

I have here post-mortem specimens illustrating several different forms of prostatic hypertrophy which I believe are suitable cases for the perineal galvanocautery operation. This one (Fig. 2) represents a bilateral prostatic enlargement without any median growth, but the urinary outlet is obstructed by elevation of the under fold of the sphincter vesicæ on account of the lateral enlargement. In this case two lateral incisions from one to two centimetres long, made separately through both lobes and near the median line, should release the elevation and produce a sufficient lowering of the vesical orifice. This next specimen (Fig. 3) is an example of a third or

Fig. 1.



Dr. Chetwood's galvanocautery used in performing operations on the prostate. The upper part shows the complete instrument, the lower the cautery knives, which can be interchanged at will.

median lobe of prostatic outgrowth supplementary to a moderate enlargement of the lateral lobes. Here obstruction is caused almost entirely by the median supergrowth, the so-called bar at the neck of the bladder. Therefore a single incision a little to one side of the median line, about one centimetre in length, should fulfil the requirements. A better example of the third prostatic lobe is a pedunculated and rounded lobule, which is sometimes seen, encroaching upon the urethral orifice of the bladder. (Fig. 4.) Such a tumor may be cut away with a prostatic rongeur, the bleeding surface singed with the cautery, and a furrow made in the same manner as already suggested in the case of the prostatic bar. Fig. 5 represents the so-called "horse-collar" formation.

Fig. 3.—Hypertrophy of the prostate, with (*a*) prostatic bar.

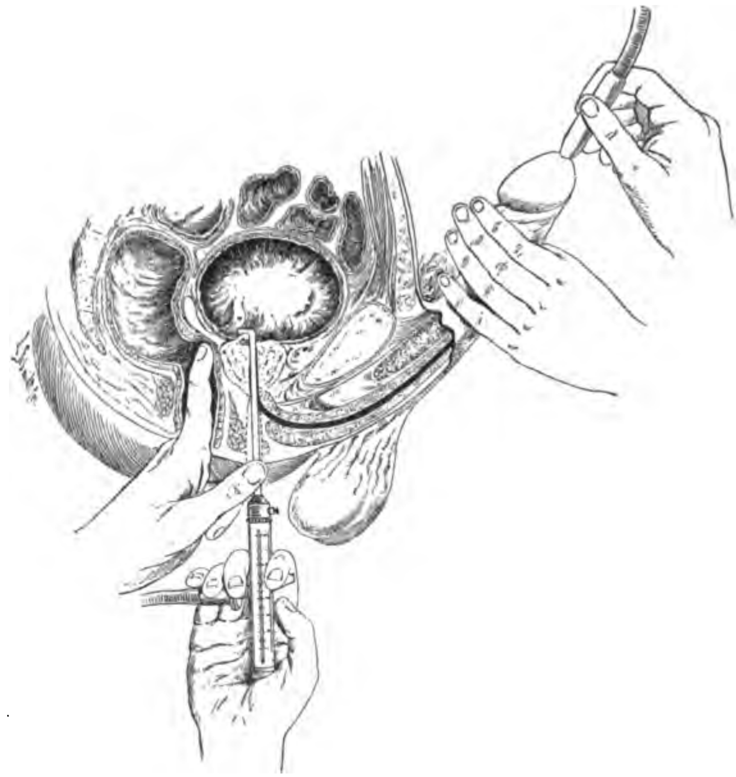
Fig. 4.—Hypertrophy of the prostate, with a pedunculated and rounded lobe (*a*).

Fig. 5.—Symmetrical hypertrophy of the prostate, with (*a*) the so-called "horse-collar" enlargement, completely encircling the urinary outlet. Such a case would probably require two good-sized incisions with the galvano cautery, one on each side of the median line, directed towards its centre.

Other forms of prostatic hypertrophy must be treated according to the individual peculiarities of each case. When the new growth consists of an extensive pedunculated mass, it may be removed by enucleation and the operation completed with the galvanocautery.

Operation.—The patient is anæsthetized with nitrous oxide followed by ether (Fig. 6). You will notice that he is placed in the

FIG. 6.



Semi-diagrammatic illustration to show method employed by Dr. Chetwood in performing prostatectomy with the galvanocautery.

lithotomy position, the bladder having been previously washed out with boric solution, a small portion of which is left in the bladder. Upon a staff introduced through the canal a short median incision is made in the perineum, so as to reach the membranous urethra, which is incised with a blunt bistoury, so that the index-finger can be passed through the opening and a digital examination made of the prostatic urethra and later of the bladder. This procedure is

generally advisable, but is not practicable where there is marked contracture of the neck of the bladder. In such cases the cautery knife is at once introduced through the perineal incision. In this patient I find a moderate bilateral prostatic enlargement, a small median lobe, and a deep bas-fond. The instrument, after being tested to see that it is in proper condition, is introduced into the bladder through the perineal opening, with its beak towards the right side and the finger of the left hand in the rectum to guide it. A quantity of cold saline solution is now permitted to pass through the irrigator, the electrical current is turned on, and ten seconds are allowed to pass before the cutting is done. The irrigating solution passes out of the perineal opening, and the exposed portions of the instrument are thus kept at a proper temperature. An incision one centimetre in length, slightly to the right of the median line, is now made. You notice that the cutting is done slowly, it having taken nearly a minute to complete the incision. The knife is now returned to its sheath, the electrical current shut off, and the cooling irrigation continued for a short time. The same procedure is repeated on the left side, but nearer the middle line, so that the course of the knife shall include the obstructing median growth. The index-finger is now introduced and a thorough examination made. In this case there is no necessity for further use of the cautery, as the two incisions have satisfactorily accomplished the object of the operation, which, as you see, can be done with facility and despatch.

The bladder is now irrigated with a mild antiseptic solution, a perineal tube is introduced for drainage, and the patient is sent to his bed with no reaction whatever as a result of the operation. The tube will be left in the perineum for about a week, and the bladder irrigated daily. When this tube is first removed, the parts are still inflamed and sensitive, and if the effort to urinate is very painful, the catheter will be used at regular intervals for a few days or until the inflammatory condition subsides, at the end of which time it is hoped that the natural function of the bladder will be re-established, enabling the patient to void urine voluntarily at normal intervals.

[NOTE.—One week after the operation the perineal tube was removed and the patient commenced to void urine through the perineal opening. A few days later micturition was performed through the normal channel at three-hour intervals; the residual urine had diminished, it being, two weeks after operation, but four drachms.]

MALIGNANT DISEASE OF THE PAROTID AND REGIONAL LYMPHATIC GLANDS; PATHOLOGICAL CONDITION OF THE TARSOMETATARSAL JOINT; FRACTURE OF THE SHAFT OF THE FEMUR; ULCERATION OF BOTH LOWER EXTREMITIES; RECURRENT APPENDICITIS; GANGLION INVOLVING FLEXOR TENDON OF MIDDLE FINGER; INOPERABLE CARCINOMA OF LOWER SEGMENT OF THE RECTUM; PLASTIC OPERATION TO REMEDY DEFORMITY OF THE NOSE; SKIN-GRAFTING; MULTIPLE CARBUNCLE OF THE NUCHA.[1]

A SURGICAL CLINIC DELIVERED AT THE RUSH MEDICAL COLLEGE HOSPITAL.

BY NICHOLAS SENN, M.D., Ph.D., LL.D.,

Professor of Principles of Surgery and Clinical Surgery, Rush Medical College; Attending Surgeon Presbyterian Hospital; Surgeon-in-chief St. Joseph's Hospital, Chicago, etc.

MALIGNANT DISEASE OF THE PAROTID AND REGIONAL LYMPHATIC GLANDS.

Gentlemen,—You will remember that this patient was operated upon at the last clinic, day before yesterday, for extensive disease involving the parotid and regional lymphatic glands of the right side. It was a case in which a preliminary ligation of the external carotid had to be made for the purpose of guarding against a dangerous, if not fatal, hemorrhage during the progress of the operation. When we extended our dissection down to the neck for the purpose of removing the carcinomatous glands, it became necessary to ligate doubly the internal jugular vein, and I pointed out to you, during the progress of the operation, the enormous turgidity of the branches of this vein on the distal side. At the point of ligation there was a very prominent large swelling formed, which extended along the branches of the internal jugular and to the veins inside of the cranium. Our operation involved the external carotid artery to the

[1] Stenographic report.

extent of six or eight inches, also the facial, the posterior auricular, and other arteries. The tissues removed from these localities required thorough excision; yet the hemorrhage was very limited indeed, owing to preliminary ligation of the external carotid. We ligated the external carotid at the point of selection and cut down at three-quarters of an inch above the point of bifurcation. The patient has not recovered consciousness. There has been well-marked paresis, involving, as we had expected, the left side of the body, the left arm, and the left side of the face. The right leg and right arm have likewise been paretic since the operation. That is something I would like to have you notice particularly, because we anticipated that, if the preliminary ligation of the carotid produced any paralysis, it would occur on the opposite side. It has been observed before that paralysis sets in on the side operated on, and I am quite confident that this paretic condition is due more to venous congestion involving the intracranial structures than to arterial anæmia. In other words, it is the result of venous disturbance rather than of a defect in the arterial circulation. The temperature of the patient is about 100° to 102° F.; the pulse is correspondingly rapid. There is well-marked paralysis of the right side of the face.

Everything about the wound looks favorable. There are no indications of any abnormal retention of the primary wound secretion, and when we recall the extent of the dissection that was made, —that is, the removal of about three-quarters of the sternocleidomastoid muscle on the mastoid side, the removal of all lymphatic glands along the submaxillary side, and the complete extirpation of the parotid, with a chain of glands extending down to within two or three inches of the clavicle,—it is not surprising that the patient is in his present condition. He has a slight febrile disturbance, which in the absence of any indications of wound infection I attribute largely to fermentation fever, created by the fibrin ferments originating in the intravenous clot resulting from the ligation of the vein. We are administering calomel in fractional doses frequently repeated. I shall direct the assistant to apply an ice-cap to the head for the purpose of controlling the temperature, and will maintain drainage for at least two or three days more, because of the enormous wound cavity, although it shows at the present time no signs of retention of secretion.

I notice that both his pupils are contracted, showing an undue

amount of intracranial congestion, which I attribute largely to the interception of the venous circulation by the ligation of the principal vein in the neck for the purpose of reaching the deepest portion of the carcinomatous chain of glands in that locality.

PATHOLOGICAL CONDITION OF THE TARSOMETATARSAL JOINT.

This case you have previously seen in the clinic. We have taken advantage of the X-ray in getting some additional light in reference to the pathological condition of the tarsometatarsal joint in this case. The difficulty has been attributed to an injury, and yet we find the swelling most marked in the tarsometatarsal joint. Whether this is the result of trauma or the trauma has been the means of inciting a tubercular infection is a question for the future to determine. We find the entire joint enormously enlarged; the ligaments are thickened; no special damage has been inflicted upon the tarsal or metatarsal bones. All that we can find by the skiagraph is great thickening of the ligamentous structures. We have instituted appropriate treatment for the purpose of promoting absorption of the pathological product. We will pass these skiagraphs around for your inspection, and you will fail to find any indications of fracture or of dislocation. We have reason to believe that the injury has been instrumental in bringing about an inflammatory condition of the joint, tubercular or otherwise, that demands attention in the future.

The patient has only recently been admitted to the hospital. We are now using an antiseptic, moist compress, and over this compress elastic, well-applied pressure. The patient will be instructed to keep the limb in an elevated position, and to make use of all resources calculated to promote the absorption of the intra-articular and periarticular pathological products. I am confident that in another week or two there will be a marked diminution in the size of the swelling. We shall mould the foot to its original position, increasing the curve of the arch for the purpose of preventing, what so often happens, the remote effect of an inflammatory flat-foot. (There is marked flat-foot now.) I shall direct the assistant, after he applies this elastic pressure, to place the foot in the position of marked flexion, for the purpose of preventing permanent deformity following inflammation of the tarsometatarsal joint. If this treatment should not lead to the desired result, I shall be strongly

tempted, in the near future, to puncture the tarsometatarsal joint from the fibular side and inject it with iodoform-glycerin emulsion.

FRACTURE OF THE SHAFT OF THE FEMUR.

A short time ago this patient was exhibited to you as the subject of a fracture of the shaft of the femur of several months' standing. I then stated that, in all probability, we should at a subsequent clinic cut down on the fracture and demonstrate the cause or causes interfering with desirable bony union. We have applied extension by weight and pulley, and have already reduced the amount of shortening from three to two inches. At the same time I noticed above the seat of injury an increasing swelling, which possibly may mean that by bringing the fractured surfaces into mutual contact there will be a production of provisional callus. What I want to show you to-day is the treatment resorted to in ordinary cases of fracture of the shaft of the femur by extension and direct fixation. I show you now the typical Buck extension apparatus,—that is, we have applied strips of adhesive plaster extending from the ankle up to about the knee-joint, a cross-piece between them, making extension with weight and pulley to the desired degree, and fixing the fragments directly by the application of short splints. These short splints I wish to demonstrate to-day. They are Gooch's splints, that you may extemporize anywhere if you can find a cigar-box, canvas, and adhesive plaster or, still better, paste made of rye flour. I am annoyed to find that this splint was not properly made by the assistants; it answers a most excellent purpose, but it is not a typical Gooch's splint, which should be a continuous structure of wood cut into narrow parallel strips after it has been fastened to canvas. I prefer in such cases to use four splints, one in front, one behind, and one on each side, all held in place with two straps supplied with buckles.

We will reapply this splint and show you the manner of fixation. I find now above the seat of fracture a much larger swelling than was detected at the time the patient came to the hospital some fifteen days ago, pointing to the existence probably of adequate provisional callus formation. We shall continue the same treatment for at least another week or two, and then, if we find no evidence of beginning consolidation, it will be absolutely necessary to cut down to the seat of injury and determine the cause or causes interfering with prompt

bony union. At any rate, we have the satisfaction of knowing that by this simple mechanical contrivance, making extension by weight and pulley, with fixation of the fragments in the manner I have already indicated, we have diminished the amount of shortening by at least one inch.

ULCERATION OF BOTH LOWER EXTREMITIES.

Here is a patient who has just come into the clinic with a very obstinate form of ulceration involving both lower extremities. It is somewhat difficult to decide whether or not these ulcerations exist in consequence of local or general causes. I have been unable to detect anywhere very marked evidences of varicose veins, and yet they are present. The external saphena is markedly distended; on the opposite side the same condition prevails; but the internal saphena appears to be intact. The patient denies venereal infection, and yet the ulcers that you see throw considerable suspicion in that direction. It is a case in which no amount of local treatment outside of a hospital promises anything in reference to speedy and permanent healing of the enormous ulcerated surfaces. The patient will be requested to enter the hospital. On the right side I may sooner or later resort to excision of the branches of the external saphenous vein, after the limb has been properly prepared. It will require time, a great deal of patience, and careful local treatment to bring the parts into a condition compatible with a safe operation upon the varicose veins; meanwhile the patient will be given the benefit of general treatment. I have no doubt that there is a general element which interferes with speedy and satisfactory healing of these enormous ulcers involving the lower part of both legs.

RECURRENT APPENDICITIS.

I show you this patient because he has been the subject of two marked attacks of appendicitis one year apart. He will show you, by placing the tip of his finger at the sore point, the exact location of the diseased appendix. He is free from any after-symptoms now, but the two relapses suggest the propriety of resorting at once to a radical operation after the patient has been prepared for it. He has been admitted to the hospital for the purpose of being subjected to such an operation during the interval, the proper time to operate.

GANGLION INVOLVING FLEXOR TENDON OF MIDDLE FINGER.

This patient was operated on at the last clinic for a very obscure infection involving the flexor tendon of the middle finger, diagnosticated by Dr. Coolidge as a ganglion. Owing to the clinical symptoms presented and the anatomical location of the affection, I had strong reasons to suspect that it might be a case of fibroid tumor involving one of the sheaths of the digital branches of the median nerve. However, the operation showed the correctness of Dr. Coolidge's diagnosis. We cut down upon the shaft of the flexor tendon, and found a well-marked, small, tense, painful ganglion, which was completely excised, the tendon sheath sutured separately, and the external wound closed in the ordinary manner with horsehair. The wound has healed kindly by primary intention.

INOPERABLE CARCINOMA INVOLVING THE LOWER SEGMENT OF THE RECTUM.

The first operative case that I show you this afternoon is one in which carcinoma of the lower segment of the rectum has unquestionably advanced beyond the limits of an advisable, feasible, justifiable radical operation. The cancer involves the lower part of the rectum and the adjacent tissues, and has been a source of great suffering to the patient, having resulted in a chronic form of intestinal obstruction. We shall at present perform simply a palliative operation; later we shall give the patient a most thorough examination, with a view of determining the propriety of attempting to remove the original difficulty. But, even in that event, we prefer to make a preliminary left inguinal Maydl colostomy. I wish now to demonstrate every step of this operation, because it is one that you will resort to in all cases in which it becomes necessary to relieve the symptoms of obstruction produced by malignant disease or by cicatricial contraction beyond the limits of the ordinary treatment by gradual dilatation. The patient has been properly prepared, and I will now begin the operation.

In the first place I determine exactly the position of Poupart's ligament, which serves as a guide in making the primary incision and in opening the abdominal cavity. Cut as few muscular fibres as possible in performing this operation, to avoid, on the one hand, prolapse of the sigmoid flexure of the rectum, and, on the other hand, hernial protrusion. I shall, therefore, open the abdominal

cavity exactly in the same manner as in operating for appendicitis by the muscle-splitting method, which I would like to have you notice particularly. I make the first incision obliquely at a point two fingers' breadth above Poupart's ligament, about the centre of this structure. We incise the skin and the underlying superficial fascia, cutting down upon the external oblique muscle, which I now expose entirely intact. You see its fibres very plainly. Let me show you how to incise them. With the knife I penetrate the muscle at the lower angle of the wound, cutting upward and outward sufficiently to enable me to insert the tip of my left index-finger, which follows the knife as a guide while I sever the fibres of the muscle. I am sure that in doing so I have not even scratched the muscle which now comes into view,—that is, the internal oblique. By using the tip of the left index-finger as a guide, I have prevented possible damage to the underlying internal oblique muscle that is now in view. Let me show you how to penetrate this muscle without doing a particle of damage to any of its fibres. The direction of the fibres of the internal oblique is almost transverse. I make a little button-hole in the centre of this muscle in the direction of its fibres; I now use the ordinary Kocher's director for enlarging the opening. I work my way down to the remaining structures, and, without dividing any of the muscular fibres, make an entrance adequately large to serve as an opening to the abdominal cavity through which to bring a loop of the large intestine. I will now pick up the remaining structures of the abdominal wall carefully, eliminating all possibility of grasping in the forceps any of the abdominal contents. The forceps I am using is the broad rat-tooth forceps, so that there is little risk of the sharp teeth grasping some of the abdominal contents; hence in elevating this cone I make use of my fingers in palpating the cone so as to exclude all possibility of inclusion of any of the abdominal contents in the grasp of the dissecting forceps. I incise this cone now and have opened the abdominal cavity. There is something to which I wish to call your attention in doing so, and that is the escape of quite a large amount of serum. This alone is suggestive of the presence of malignant disease within the reach of the peritoneal cavity.

The assistant will now apply forceps on the opposite side, so as to prevent the peritoneum from retracting, and I will, chiefly by blunt force, enlarge the peritoneal opening, which you see is large

enough to admit three fingers. Notice the amount of serum that is escaping. I look for the intestine that I am in search of, and, fortunately, in this instance the sigmoid flexure at once comes into view and within easy reach. Very often in performing this part of the operation a loop of the small intestine presents itself and we have to replace it. In other instances the mesosigmoid is so short that the bowel cannot be brought well forward into the wound. Those are the cases which are extremely difficult to manage by performing Maydl's typical left inguinal colostomy. In this case the mesosigmoid is amply long; I can bring the sigmoid flexure well forward into the wound without any harmful tension.

At this point the operator has to determine the extent of the original local disease by intraperitoneal palpation, and to settle the question whether or not the loop of the sigmoid flexure is in proper position. These two things we now investigate. I insert my left index-finger and palpate the pelvic floor, and I will tell you what I feel. The upper part of the rectum feels hard and nodular; it is attached to the posterior wall of the pelvis, to the sacral excavation. I extend my exploration a little farther and palpate the glands along the iliac vessels, and I have no difficulty whatever in determining the existence of marked regional infection. Some of these lymphatic glands accompanying the iliac vessels are as large as a pea; their existence precludes at once the advisability of resorting to a radical operation at any time. I have not made a very thorough rectal examination, but what I have learned from palpating the pelvis satisfies me that this patient is entirely beyond the reach of all radical surgical procedures,—that we will have to be content in performing a palliative operation.

I will investigate the condition of the sigmoid. I follow the lower end of this loop of intestine downward, the upper one in an upward direction. I, therefore, know that the bowel which presents itself is in proper position. Occasionally, in consequence of chronic obstruction, a volvulus occurs. This loop is twisted, and if it were anchored in the position in which it presents itself, we would find, in opening it later, that the intestinal contents would escape from the lower end, or what we supposed was the lower end. This has happened twice to no less an authority than König, and it has happened twice in my own practice. It does no material harm, but, after all, it is advisable to anchor the sigmoid flexure in proper posi-

tion, which I am now doing. This is the distal end [indicating], and this is the proximal end. I now look for the mesosigmoid, which I will tunnel presently with a pair of ordinary hæmostatic forceps, selecting a place where I cannot detect any of the large vessels. I show you the mesosigmoid. Here is the point close to the bowel, yet at a safe distance I find a place where large vessels are absent. I have a pair of ordinary forceps locked, I push it through the mesosigmoid, dilate the channel, and will now insert the Maydl bridge, which is simply a small cylinder of glass surrounded by two or three layers of iodoform gauze. I grasp the end of this gauze cover or envelope, draw the bridge through the tunnel already made, and anchor the loop in the external wound. Maydl depended on his bridge to keep the loop of the bowel in proper position, and advises at this stage of the operation that the surgeon should surround the base of the loop with iodoform gauze to permit nature's efforts to exclude the peritoneal cavity from all sources of infection by the formation of firm adhesions prior to opening the bowel. I have learned better. In one of these cases I followed the advice of Maydl to the letter. The patient, after recovering from the immediate effects of the anæsthetic, coughed severely, and the next day, when I was summoned, I found a number of loops of the small intestine extruding from the wound. It taught me a very important lesson,—that is, invariably to suture the parietal peritoneum to the base of the sigmoid loop, which we do now, to shut out by mechanical means the peritoneal cavity. I will ask the nurse for a round needle and very fine catgut. I grasp the parietal peritoneum on this side, and shall do the same on the opposite [illustrating]. We now suture the loop in proper position. Here is the parietal peritoneum on the tip of my index-finger. I will insert one stitch at this point [indicating], grasp the parietal peritoneum, and see how much of this intestinal loop it will be well to leave outside of the abdominal incision, returning a little of the bowel. I take a stitch at this point [indicating] where there are no visible blood-vessels, including the peritoneum and muscular coat, and tie this stitch. I shall take a similar stitch on the opposite side. On this side I think it will be more convenient first to grasp with my needle the tunics, next the serosa and muscularis of the bowel, then the parietal peritoneum. I show you the tip of my needle, and tie. We have anchored the distal limit of the loop, with two stitches in the parietal peritoneum. I shall do the same on the

opposite side. I lift up the peritoneum as before, transfix it, place the loop in proper position, include within the grasp of the needle the serous and muscular coats, and we have the stitch in position. The last stitch remains to be taken on the opposite side. I lift up the parietal peritoneum with the tip of my finger, replace a part of the loop of the bowel that is not needed in the formation of an efficient artificial anus, and transfix here the serosa and muscularis.

We have now four fixation sutures in place, and all that remains to be done is to bring the two limits of the intestinal loop in close contact for the purpose of forming an efficient spur. That is an important matter in the formation of an artificial anus. This is done by taking two stitches below the Maydl bridge and uniting the two limits to the extent of about an inch or two in the manner which you observe now. I lift up the Maydl bridge, expose the two limits, transfix the serosa and muscularis at a point half an inch below the Maydl bridge, tie, and our first stitch is in place, cut short to the knot. This is an operation which all of you should be absolutely familiar with. I take another stitch a little lower down, immediately outside of the grasp of the other stitches, uniting the intestinal loop with the parietal peritoneum. This will now unite, as you see, about an inch and a half of the two limits of the loop accurately, making sharp flexion at a point immediately opposite the Maydl bridge. The second stitch is in place. I am using an ordinary cambric needle with fine silk, the instrument and material which you should invariably select in performing this and similar operations on the intestines. We have now the intestinal loop safely anchored in the wound, in the first place by Maydl's bridge, and in the second place by four sutures, with which the base of this loop has been fastened to the abdominal incision. I will diminish the size of the external opening a little by inserting two or three sutures of silkworm gut, suturing the wound close to the base of the protruding intestinal loop. I am extremely desirous that you should observe every detail of this operation, because it is one that you will be frequently called upon to perform in cases of malignant or cicatricial stenosis of the rectum beyond the limits of more conservative measures. I now diminish the size of the incision on this side.

I wish to show you how the dressing should be applied after performing the first step of this operation. It is not my intention to open the intestine to-day. I hope to be able to borrow enough time

from my colleague (Professor Fenger) to bring this patient in here two days hence, when I shall open the intestine and establish a fistula. We have the sigmoid flexure in proper position. The wound is closed up to the base of the two limits of the intestinal loop, which is safely anchored in the abdominal incision upon Maydl's bridge, and in addition by four sutures connecting it with the parietal peritoneum. I will dust the parts thoroughly with boro-salicylic powder and show you how to dress the intestinal prolapse. The margins of the abdominal incision hug very closely the base of the intestinal loop, which rests upon this Maydl bridge; there is absolutely no possibility of a return of the large intestine nor of a prolapse of the loops of the small intestine. I will surround the base of this loop with a narrow strip of iodoform gauze. I would like to have you notice particularly how it is applied underneath the bridge, hugging the base of the loop closely. With iodoform collodion we will seal the dressing to the base of the intestinal loop and to the surface of the abdomen, saturating the strip of iodoform gauze all around. We shall make an occlusive dressing, which when we come to incise the intestinal loop will be of the utmost service in preventing the ingress of any of the intestinal contents into the abdominal incision. Upon this hermetical sealing of the parts I place the greatest stress, because later, when we come to open the bowel, leakage from the open intestine might result in infection of the abdominal incision, if not in peritonitis. No such danger is encountered after dealing with the abdominal incision and protruded intestinal loop in the manner which you have just witnessed. I will let the collodion dry, then we will apply over it a strip of gutta-percha as an additional protection. I tear an opening in the gutta-percha large enough to receive the protruded part of the bowel, place upon it the Maydl bridge, and then cut it so that it will be of adequate size. This piece of gutta-percha with a central opening, Maydl's bridge, and the sigmoid loop will be sealed to the surface of the abdomen again with collodion. This gutta-percha protection proves very useful, after we establish the artificial anus, in diverting from the abdominal incision the intestinal contents. I seal this gutta-percha safely in position, and we are now ready to apply the external dressing.

Day after to-morrow we shall make the visceral incision over the Maydl bridge, including about two-thirds of the circumference of

the bowel. It can be made without a general or local anæsthetic, because the gastro-intestinal tract is not sensitive to pain when in a normal condition, as I shall be able to demonstrate. Notice how I apply the external dressing. I desire that no harmful pressure be exerted over the protruding loop of bowel, and particularly over the Maydl bridge; hence I take ordinary sterile absorbent gauze and apply a dressing in the form of a bird's-nest in this way,—that is, dressing to one side of the intestinal loop, leaving the central part of the loop free, to relieve or protect it from all possible sources of pressure. Over this circular dressing we will apply the usual absorbent aseptic dressing.

PLASTIC OPERATION TO REMEDY A DEFORMITY OF THE NOSE.

This patient was brought into the clinic early last Spring. I made a plastic operation for the purpose of correcting a hideous deformity of the nose that had resulted from constitutional syphilis. It is one of those cases of complete destruction of the septum followed by saddle-nose. I took from the frontal region a large flap, including evidently a little of the scalp, and shall endeavor to-day to relieve the patient of the annoyance of hair growing at the lower margin of the flap. That I shall excise. I believe I can do so successfully without resorting to skin-grafting. I shall include in the excision the entire thickness of the skin, leaving a superficial wound admirably adapted for healing speedily by granulation and epidermization. I take the thickness of the skin, sacrificing as little of the flap as possible. This small wound will heal speedily by epidermization. I have to do something else. On the opposite side there is a little superfluity of tissue resulting from the plastic operation that I wish to remove by a V-shaped incision; then the patient will be in a condition to be treated by moulding the nose into a desirable shape, and that is something I would like to have you watch closely hereafter. With a splint of lead I shall, in the future, make a legitimate attempt to improve the shape of the nose, and you will be astonished to see how far we shall succeed. I make a V-shaped excision. I do not wish to contract the nose in any way, so I excise this wedge and close the resulting wound. It does not affect the nose in any way whatever. I take the first stitch at the base of the ala of the nose. With a few stitches the assistant attaches the margin of the wound of the nasal side to that of the side of the cheek,

which will do away with this unsightly lateral projection. After the wound has healed you can see what may be done by moulding. That is what we propose to do, and keep the tip of the nose in proper position with a splint of lead of proper construction. We shall be able materially to improve the cosmetic effect of the former plastic operation. Remember, there was hardly any nose here at all, and what there is now was made of this flap taken from the frontal region. The result so far is all that could have been expected, and it only remains to do a little moulding to bring the nose into a desirable shape.

SKIN-GRAFTING AFTER OSTEOMYELITIS.

In this case a small surface defect has been left as the result of very extensive osteomyelitis, and we wish to-day to pave over the surface with a few Reverdin skin-grafts. I will make only one of these grafts myself to show you the technique of the little operation. I have pointed out to you the prerequisites of successful skin-grafting. With small grafts the operation may prove successful. The only instruments you need for Reverdin skin-grafting are one or two long needles—you can get along without needle-holders and without hæmostatic forceps—and a very sharp razor. Many instruments have been devised, such as special scissors and other cutting instruments; but they can be dispensed with by using a needle with which to transfix the epidermis and a sharp razor in cutting off the minute epidermic grafts. We must remember the exact position of the raw surface, because these grafts must be planted properly. I must bring the raw surface in contact with the granulations, which I do in this manner [indicating]. I plant the graft with the raw surface down, placing it in position, as you observe. It must be planted carefully; so I take the same needle and with it lift the graft forward, backward, and laterally, until I find for it a little depression in the granulating surface into which it fits. The assistants will now plant three or four more of these grafts, which will afterwards be shielded with a strip of protective silk, and over that we will apply an ordinary aseptic thick compress, wrung out of physiologic salt solution, covered with gutta-percha, mackintosh, or protective silk.

MULTIPLE CARBUNCLE OF THE NUCHA.

This is a case of multiple carbuncle of the nucha. If I should make the crucial incision advised by the old authors, there would be

absolutely no chance of eliminating the original cause of the difficulty. The furuncles in the periphery of the carbuncular area would not be touched; they would pursue their relentless course. By making a clean excision we will remove every one of the furuncles as well as the source of the disease. I excise freely in this case, because it is remarkable how speedily and promptly such wounds heal after the removal of carbuncles of large size, the resulting defect closing nicely in the course of three or four weeks. By performing this radical operation we protect the patient against the immediate and the remote effects of general infection. You will observe that I carry the incision quite deep, and go beyond the limits of the œdematous area. I pick up now the lower angle of this loop, being sure in removing the carbuncular tissue to cut at a safe distance from the source of infection, making a deep excision. All of the tissues I am excising are œdematous, and you will be somewhat astonished at the size of the wound defect after the removal of the carbuncular mass. I show you now the carbuncle excised, with all of the infiltrated œdematous tissue around it. We shall give this wound a thorough disinfection, pouring into it peroxide of hydrogen, followed by a flushing with five per cent. solution of carbolic acid, tampon it with iodoform gauze, and apply over it a compress moistened with two and a half per cent. solution of carbolic acid.

MOVABLE KIDNEY.

BY G. FRANK LYDSTON, M.D.,

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Movable kidney occurs much more frequently than is generally supposed, and to it are referable many cases of obscure abdominal disease. As the kidney is not firmly attached in its normal position, but possesses more or less freedom of movement, it is not surprising that it sometimes becomes displaced. Movable kidney is most frequently met among females. In two hundred and ninety cases reported by Newman, two hundred and fifty-two occurred in women, and thirty-eight in men, the proportion being about one in seven. The same ratio was found to exist by Henry Morris. The right kidney is affected more frequently than the left, and occasionally both kidneys are involved. In one hundred and seventy-three of Newman's cases, the displacement in one hundred and fifty two was on the right side, in twelve on the left, and in nine was present in both organs. Displacement of the kidney seems to bear a more or less definite relation to muscular strain and exertion. In Germany, it is said that movable kidney is of frequent occurrence among the lower classes, among whom much hard physical work is done by women.

The influence of pressure is well shown by the manner in which the tumor formed by a dislocated kidney moves about in the abdomen under mechanical disturbance. The kidney may be pressed forward against the anterior abdominal wall, and be mistaken for an abdominal tumor, or it may be pushed downward into the pelvis, and be confounded with uterine or ovarian growths. If adhesions take place, mistakes are very liable to occur, particularly if the organ becomes fixed in the abdomen. Many cases of wandering kidney are congenital. Displacements of the kidney are divided into two classes by Newman, namely, movable kidney, the more frequent variety, in which the kidney moves behind the peritoneum,

and true floating kidney, in which the organ is attached to the spine by a mesonephron, and floats about freely in the peritoneal cavity.

There are several causes of wandering kidney. An exposed position of the organ, due to sparsity of connective tissue about it, or unusual laxity and flabbiness of its areolar capsule, may be predisposing causes. Should the abdominal walls be lax and flabby, furnishing inadequate support to the abdominal viscera, displacement of the kidney may be caused by comparatively slight causes, such as moderate muscular exertion. Repeated pregnancies thus predispose to renal displacement, by producing a pendulous abdomen. Falls, hard riding, shocks, and strain experienced in athletic exercises, have been known to cause the affection. An effective cause among the working-classes is the use of a tight strap or band to support the clothing. Tightly laced corsets may have the same effect. Absorption of the perirenal fat is undoubtedly a very important causal factor. The kidney is not very well supported at best, and, once this fatty cushion is removed, a certain degree of movement is almost inevitable. Congenitally defective development of the fatty capsule may exist in some cases. Diseases that produce profound nutritive disturbance, with consequent wasting, also, may act as a predisposing cause of movable kidney. Displacement of the kidney caused by blows received in the lumbar region has been recorded. When a moderate amount of displacement has taken place, the movements of respiration, the weight of the clothing, or the pressure of the pregnant uterus tend to increase it. The right kidney occupies a more exposed position than the left, and this, with its proximity to the liver, predisposes to its displacement rather than that of its fellow, and explains the more frequent occurrence of the lesion on the right side shown clinically by the recorded cases. It is probable that counter-pressure by the liver may favor dislocation of the kidney under strain or abdominal compression, the right kidney slipping from between the abdominal wall and the liver just as a bean when pressed upon slips from between the thumb and finger.

The symptoms of movable kidney are variable and by no means characteristic. A moderate degree of dislocation in some cases is sufficient to produce severe symptoms, while marked displacement in other instances may produce comparatively little discomfort. In many cases the diagnosis is obscure, for the reason that the function

of the kidney is rarely, if ever, disturbed, the organ being apparently perfectly normal and performing its functions as under ordinary circumstances. Symptoms referable to the uterus and the bladder have been noted in connection with wandering kidney, and are probably dependent upon reflex nervous disturbance produced by the displacement of the organ rather than upon any direct influence exerted by it. General nervous disturbances, such as hysteria in the female, melancholia, and hypochondriasis have been referred to wandering kidney. Such complications, however, are ascribed to the psychic disturbance incidental to a knowledge of the existence of some abdominal derangement rather than to any direct influence upon the nervous system or general nutrition. In common with other affections of the abdominal viscera, wandering kidney produces more or less disturbance of the digestive functions, often manifested by colicky pains referred to the stomach and bowels, and dyspepsia, with or without flatulence. Certain cases of flatulence, dyspepsia, and dilatation of the stomach have been attributed to pressure of the wandering kidney upon the duodenum, this pressure being supposed to cause retention of a portion of the contents of the stomach, which, decomposing, produces gaseous distention of that organ and irritation of its mucous membrane.

Abdominal pains of a dragging or tugging character, and a sensation as of something falling down or moving about in the abdominal cavity, particularly when the patient rises from a sitting or recumbent to a standing posture or makes unusual muscular exertion, constitute the most characteristic symptoms of wandering kidney. Severe pain with tenderness of the tumor formed by the displaced organ occasionally occurs, and has been attributed to a localized inflammation of the serous investment of the organ or to simple neuralgia. The hepatic functions are sometimes disturbed, by pressure upon and irritation of the liver produced by the renal tumor. Wandering kidney, as a rule, does not endanger life. It is true, there are cases on record in which the patients have died apparently from exhaustion due to chronic stomachic disturbance, continued pain, and nervous depression. Malignant disease may develop in the displaced organ, and this is an important factor in deciding the question of operation.

The diagnosis of movable or wandering kidney, as a rule, is readily made. The surgeon may be consulted first in regard to an

abdominal tumor, the character of which from its form and extreme mobility is easily determined by physical examination. The tumor is usually situated between the free border of the ribs and the crista ilii, and is most readily detected by bimanual examination with the patient lying upon the face. When the patient is thin, the displaced kidney may be grasped between the hands and readily outlined. In obese subjects, however, it is not always easy to detect the kidney. When the tumor has been discovered it can easily be pressed back; it will often recede spontaneously into the normal position of the kidney if the patient be placed upon his back.

There are several affections for which floating kidney may be mistaken. When the organ becomes displaced downward into the pelvic cavity, it may be diagnosed erroneously as a small ovarian or fibroid tumor. Operations have been performed for the removal of a tumor, supposed to be ovarian, which, upon opening the abdomen, has proved to be a displaced kidney. There is a possibility of mistaking a distended gall-bladder or a movable liver for wandering kidney. This point should be remembered.

Omental tumors, also, may be mistaken for wandering kidney, the diagnosis being often impossible without opening the abdomen. An enlarged and displaced spleen may simulate movable kidney to a certain extent, but the peculiar shape and the relatively greater size of the splenic tumor usually render the differentiation comparatively easy. We may exclude pelvic tumors of various kinds by vaginal examination and by aspiration; the latter procedure, however, is rarely warrantable.

In the majority of cases of wandering kidney the treatment should be conservative. Surgical intervention should be reserved for the extreme cases. The patient should avoid muscular strain, and if constipation exists it should be relieved, to prevent pressure upon the kidney, through the medium of the intervening viscera, by the abdominal muscles during defecation. An abdominal bandage of knitted elastic is often serviceable in retaining the kidney in its normal position. Pads and trusses of various kinds have been suggested and have been indifferently useful. When mechanical support fails to hold the kidney in place, or if pain, hypochondria, dyspepsia, flatulence, and inconvenience in locomotion continue in spite of abdominal support, recourse must be had to surgical intervention. Operations for movable kidney come under two heads:

First, nephrectomy, complete removal of kidney; second, nephrorrhaphy, fixation of the kidney. The results of nephrectomy have been only fair. Thus, in one early series of sixteen cases, six were fatal; of the six fatal cases, the kidney was diseased in three. While a single kidney is sufficient for the needs of the economy under normal circumstances, it must be admitted that in case the sole remaining kidney is unsound, the patient's chances of recovery are slight. Nephrectomy through the lumbar incision might possibly be performed without the operator having ascertained whether or not the patient has more than one kidney, and, inasmuch as nephrectomies have been performed that have proved fatal, because the patient had only one kidney, it is well to consider seriously this particular objection to nephrectomy for wandering kidney. The operation should certainly never be performed until ureteral catheterization, cystoscopy, or the Harris method has proved the presence of two kidneys. Neither should it be performed where both kidneys are diseased. It is good practice to attempt to fix the kidney in all cases unless the affected organ has undergone malignant degeneration. Fixation is best secured by making a lumbar incision and stitching the fibrous and adipose capsule of the kidney to the lips of the lumbar wound.

The literature of this operation is not yet extensive, but is daily increasing and offers considerable encouragement for the future of the procedure. The method is certainly well worth a trial, inasmuch as, in competent hands, it is not very dangerous. Should it fail, nephrectomy should be done as a *dernier ressort*. An operation of this kind, which has for its object not only the cure of invalidism and the relief of great physical agony, but also the preservation of an important excretory organ, is certainly well worthy of consideration in all serious cases of floating kidney. The success thus far attained has been sufficient to obtain general recognition of the operation as a rational surgical procedure.

EXPLORATORY INCISIONS IN DOUBTFUL TUMORS.

BY P. QUÉNU, M.D.,

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VERNEUIL was in the habit of saying, and not without reason, that cancer is the opprobrium of modern surgery; this is equivalent to saying that improvement in the operative methods brought to bear on it ought to be a constant preoccupation to the surgeon's mind. Still, although cancer yet remains a constant cause of discouragement to us, it is only fair to admit that the effort expended of late years in the fight against this adversary has resulted in a remarkable improvement in its prognosis. To begin with, since we can claim that the risk from the mere operation has been considerably reduced, patients are encouraged by the successful cases they hear of among their acquaintances, and agree more readily and at an earlier date to a proposed examination and even operation; and it can be said that at the present time our operative interventions are not only becoming more and more certain, bold, and complete, but more precarious as well. Nowhere so much as in the surgical treatment of malignant tumors is an early decision imperative. There can be no doubt that to prompt operations are due the many cases of life prolonged for periods of from three to five years, and it will be to such operations that prolongation of life for from ten to fifteen years, which was formerly so uncommon, will become more frequent. Cancer surgery must no longer be a disguised form of death-warrant, and our present hope is in the efficacy of an early operation.

But some one will reply, who ever saw the contrary? What surgeon is there who in presence of a tumor of the breast, for instance, does not insist on an immediate operation as soon as he has quite satisfied himself that the disorder is a malignant tumor? No doubt this is the usual course followed; but is that what is understood by an early intervention? Not at all. When a tumor that has been doubtful begins to show manifest signs of its malignant

nature, it is too late. For what are the certain signs whose appearance settles the diagnosis and makes an operation imperative? They are adhesions (to the skin or to the deeper tissues), enlarged glands, rapid growth, and even reaction on the general condition of health, —in other words, so many obstacles to complete removal of the neoplasm and so many risks of rapid recurrence or of generalization.

Although this applies to tumors of all the regions that are easily accessible, I have purposely chosen those of the breast. I have done this not only because the mammary gland is one of the commonest seats of the different tumors, but also because the reaction peculiar to its parenchyma, mammitis, is a special source of trouble in making an early diagnosis. This inflammatory process is often observed by itself; but, since it accompanies to a greater or less degree all neoplasms, whether harmless or malignant, its presence can only lead us astray. Not only this, but we know that simple nodi of mammitis, with all their innocent appearance, are often nothing else than pretexts for epitheliomata. It is, therefore, clear that the removal of any tumor of the breast, even of a benign nature, is a rational course of action. In addition to the pain and hinderance to movement caused by their mere presence, it is always possible that they may undergo malignant transformation. Iodide of potassium, which is still systematically used by many surgeons for a period of several weeks in cases of doubtful neoplasms of the breast, has no doubt prevented many a removal of gummata and inflammatory nodi; but, not to speak of the stimulating action that it appears to have on certain malignant tumors, how many times has it not simply postponed, to the patient's detriment, an operation that might have been useful?

In the domain of abdominal tumors exploratory laparotomy may safely be said to have been definitely adopted. Such an operation can be made curative, if the circumstances warrant it, and in any case it defines the nature and seat of doubtful tumors. In the presence of an abdominal tumor the surgeon now derives his operative indication not from an idea of certainty, but from an idea of doubt. The reason of this is that the first operations made for gastric, intestinal, and uterine neoplasms soon showed that enlarged glands and adhesions constituted not only a risk but a certainty of relapse; and since then tumors are regarded as beyond operation when accompanied by lesions of this order. Exploratory laparotomy is,

therefore, less useful in confirming the diagnosis of the malignant character of a tumor than in settling the question as to whether it is fit for operation.

A patient in whose case we had made the diagnosis of malignant, vegetating tumor of the ovary, in spite of the fact that the large neoplasm seemed to be completely fixed, a condition which made the possibility of removal more than problematic, was given the chance of an exploratory laparotomy. Beneath the ascites we found an enormous tumor, like a cauliflower, filling Douglas's pouch and appearing to be adherent to the rectum, and all my efforts to free it were at first useless. Nevertheless, I performed vaginal hysterectomy, and this large tumor, which was, so to speak, imprisoned behind the uterus, was immediately set free, and I was able to remove the whole of it. The patient has left our wards and has since been seen in excellent health, so that we feel warranted in hoping that she has entirely recovered. This is a striking example of the benefit of an exploratory laparotomy.

When tumors are more accessible and when a simple incision of the soft tissues can bring them to light, they should also be subjected to a similar operative process,—an exploratory incision. I make it a rule never to remove a doubtful neoplasm without having ascertained its nature by a direct incision just before operating. I do even more than this, as I make an early exploratory incision in every tumor whose character appears to me suspicious. It is needless to say that this last remark is applicable only in cases where an operation is possible,—that is, one in which the exploratory incision may be immediately followed up by the operation that the nature of the disorder requires. It is, for instance, not at all my idea to advise an exploratory incision in such a case as a voluminous sarcoma of the pelvis, whose nature is rarely doubtful, and which appears to develop more rapidly than ever if even a simple puncture is made in it.

The first step, then, in an intervention is to remove the doubtful tumor as if it were of a harmless nature; by this I mean that the removal should be complete, but should concern only the tumor itself. We are then in a position to decide on a definite course of action, no longer by means of uncertain symptoms, but by direct anatomical examination. A rapid inspection of the tumor in our hands will, as a general rule, soon settle all doubts. With the tumor

on the table, where its contents can no longer inoculate the tissues, we may at our leisure make sections, examine every part of it, and scrape its surface. Nothing is easier than to recognize with the naked eye and at once the scirrhous nature of a neoplasm. Although it is possible sometimes to hesitate with conjunctive tumors, this is not the case with epithelial tumors, in which the appearance, the peculiar hardness, and lines radiating from the centre to the periphery, as well as the juice furnished by scraping, are for all practical purposes as demonstrative as a histological examination.

Then, laying aside through precaution both the instruments used in removing the tumor and those employed in examining it, we have to decide on one of two courses of action, which will be readily inferred. The tumor either seems harmless, and all that remains to be done is to sew up the incision; or else it has been found to be malignant, and we then proceed to a very free extirpation of its cellular surroundings, and to a seeking after the glands all the more patient and minute because in such cases they are not macroscopically altered. This means that after having removed all the tumor which our eyes and fingers can detect, the *anatomical* cancer, we try to reach the invisible or *histological* cancer, as well as the infiltrations, of whose extent we are unaware, but whose limits we can only hope to attain by going beyond them.

Let me give a few instances of this method of procedure.

In July, 1899, I was consulted by a woman of sixty, who showed on the right breast a little depression of the skin, without subjacent induration, consequently without tumor or gland. Nevertheless, since I attach the greatest importance to the slightest depression of the skin of the breast, I asked my patient to return in three months. I did not see her again until eighteen months later, and then found that the depression had slightly increased and that beneath it the breast seemed a little more resistant than elsewhere. I proposed an exploratory incision, to be followed by whatever operation might appear necessary. On making the incision, I found a scirrhous induration of the size of a pea, and removed the entire breast and the glands of the axilla. Histological examination confirmed my macroscopic diagnosis.

Another patient had already seen two other surgeons, who made the diagnosis of cancer of the breast. On finding evident induration, somewhat inherent to the deeper tissues and accompanied by

slight depression of the skin, I was at first of the same opinion; still, the nature of the pain felt by the patient led me to hesitate, and before removing the breast I made an incision in the tumor, and found it to be simply a small fibrocaseous nodus that had probably originated in a diseased rib. It was cured in a few days by scraping, followed by sutures. On the other hand, the first histological case of mammary tuberculosis, which I published in the *Revue de chirurgie* in 1882, concerned a patient whose breast had been freely removed for a supposed cancer. The specimen was brought to me for examination; macroscopically it was tuberculosis, and the microscope confirmed the diagnosis.

A year ago I saw a patient who appeared to be suffering from syphilitic lesions of one testicle; nevertheless, as the specific treatment produced no change in it, I made an exploratory incision into the testis, found a cancer, and performed castration. In another case I made an incision into an uncertain tumor of the epididymis which had resisted specific treatment; but this I found to be a gumma, which I removed and examined histologically.

It is easy to understand the two advantages of the exploratory incision in tumors of an uncertain nature: it enables the surgeon to bring to bear the exact means which the case demands, and he errs neither by excess, which is bad, nor by default, which is worse. For if it is unfortunate for a surgeon to realize after totally removing a breast that the lesion was a harmless one, it is far more unfortunate to detect undoubted signs of the malignant nature of a tumor at a stage when a radical operation is no longer possible.

PARTIAL THYROIDECTOMY FOR CYSTIC GOITRE; SARCOMA OF THE BONES OF THE FOREARM; INGUINAL COLOSTOMY FOR CANCER OF THE SIGMOID; EXCISION OF A PORTION OF THE SIGMOID; DOUBLE FEMORAL HERNIA; RESECTION OF A RIB FOR EMPYEMA; VAGINAL HYSTERECTOMY FOR INCIPIENT CARCINOMA UTERI; EXSECTION OF THE LEFT LINGUAL NERVE; EXCISION OF A WEN.

ABSTRACTS FROM THE PUBLIC SATURDAY CLINICAL LECTURES DELIVERED AT THE GERMAN HOSPITAL.

BY JOHN B. DEAVER, M.D.,
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PARTIAL THYROIDECTOMY FOR CYSTIC GOITRE.

L. C., female, white, aged thirty-nine years. Eight years ago a tumor about the size of an English walnut was noticed in her neck. Two years ago it began to enlarge rapidly, and since that time she has been subjected to various forms of useless and harmful treatment by electricity, hypodermic injections, and faith cure.

The tumor occupies the left lateral aspect of the neck and reaches to the right beyond the median line. It moves with deglutition and with respiration, showing that it is a growth of the thyroid and not of the larynx. Pressure symptoms from interference with these functions are now becoming marked. The diagnosis is cystic goitre.

Goitre is an hypertrophy and hyperplasia of the thyroid body. Suppuration of the thyroid is excessively rare. In the large experience of Agnew it occurred but once, and but one other instance of its occurrence is reported. The varieties of goitre are parenchymatous, hyperplastic, or cicatricial, cystic, vascular, calcareous, and malignant. Of these the cystic is most common. The calcareous

form is a degenerative process. The vascular variety resembles the vascular dilatation and overgrowth seen in a cirsoid aneurism.

Some of the methods now used in the treatment of goitre are most harmful. In operating on a patient who had been subjected to electrolysis and to local hypodermic injection, extensive inflammatory adhesions were found, in releasing which the internal jugular vein was torn. The left recurrent laryngeal nerve being included in the scar tissue, there was aphonia before operation, and this persisted. A laryngological examination by Dr. J. Solis-Cohen demonstrated paralysis of the left vocal band.

Some cases recover without any interference. Goitre in girls is apt to subside with the onset of menstruation. Large doses of compound tincture of iodine internally sometimes do good, but are apt to disorder the digestion. Ergot exercises only a temporary influence over vascular goitre.

The anatomy of the thyroid body is most important. The deep cervical fascia consists of anterior and posterior layers; the anterior portion divides into two laminæ at the posterior border of the sterno-cleidomastoid muscle. The outer layer, enveloping this muscle, is continued forward, encasing the depressor muscles of the hyoid bone. The deeper layer forms the carotid sheath, envelops the thyroid body, and is continued over the trachea into the mediastinum (pre-tracheal fascia). The gland consists of two lateral lobes and a connecting isthmus. The isthmus normally is at the level of the second and third rings of the trachea; but in conditions of hypertrophy, it may cover seven or eight rings and descend into the mediastinum. The lateral lobes are in contact with the trachea, the cricoid cartilage, and the lower lateral aspects of the thyroid cartilage. They are also in relation with the carotid artery, the internal jugular vein, the descendens hypoglossi, the pneumogastric, the sympathetic, and the recurrent laryngeal nerves, the latter lying in the tracheo-œsophageal groove. The blood supply of the thyroid gland is derived from the inferior thyroid artery, a branch of the thyroid axis, and the superior thyroid, a branch of the external carotid artery.

In operating for diseased conditions of this gland care must be taken not to remove the entire organ. Cure followed by myxœdema is worse than the disease. Adhesions may render operation difficult. The isthmus may be transfixed by a pedicle needle carrying a double ligature and tied off, as is done with an ovarian pedicle. The in-

cision should be semilunar in shape, with convexity downward, so that the scar will be concealed by the clothing. If exposure of the mass cannot be obtained by this method, a Y-shaped incision may be used.

Operation.—The patient was placed in the horizontal position with the head supported on a firm pillow. A semilunar incision was made, its convexity reaching beneath the mass and well down to the base of the neck. The skin and superficial fascia were divided. The bleeding vessels were caught with hæmostatic forceps, and the exposed veins were seized with forceps and divided. The flaps of skin and fascia were dissected free by means of the scalpel, tissue forceps, and the finger covered with gauze.

The head was depressed to elongate the neck and the anterior margin of the sternocleidomastoid muscle was located. After sponging the mass the sternohyoid and sternothyroid muscles were seen covering the growth. Incision was carried down between these muscles. The superficial vessels grasped in hæmostats were then tied to rid the wound of the forceps. The ribbon muscles were next worked to the sides of the mass by the handle of the scalpel and by the finger covered with gauze. The finger was passed beneath the goitre and it was separated from the recurrent laryngeal nerve in the tracheo-œsophageal groove. Having guarded this nerve by gauze, enucleation proceeded more rapidly. Adhesions were present and the tissues vascular. Several veins were torn. The dissection was continued along the lateral aspect of the growth, the inferior vessels being uncovered, grasped by forceps, and divided between. A small abscess was encountered, probably the result of the injection. The goitre was separated above.

A double silk ligature was passed through the isthmus by transfixing it with a pedicle needle. The capsule was incised. The ligatures were tied and their ends joined around the pedicle. The goitre, which involved the left side only, was cut away with scissors. The wound was sponged and the vessels were tied with catgut.

The structures exposed in the wound were the edge of the sternocleidomastoid muscle, the carotid artery and internal jugular vein, and the trachea. The œsophagus was not exposed, the dissection not having reached the posterior border of the thyroid cartilage; the recurrent laryngeal nerve was thus protected.

A fine rubber drainage-tube was secured in the lowest portion of

the wound by a silkworm-gut suture. The incision was closed by interrupted sutures of silkworm gut, the first suture being passed in the angle of the wound and the others from the middle of the wound towards each angle. They were tied as introduced. In passing the first suture care was taken to avoid puncture of the external jugular vein.

Dressings of moist gauze, dry gauze, and absorbent cotton were applied over the wound and fixed by a roller bandage, which included the neck and the anterior chest and passed beneath the axillæ. It was bound by adhesive strips.

The drainage-tube was removed on the fifth day and the stitches on the eighth, when the patient was transferred to the out-patient department for further treatment.

Examination of the specimen showed that it measured ten by nine by eight centimetres. It was firm to the touch and on section revealed a gelatinous substance held in place by irregular bands of connective tissue. Microscopically the well-known lesions of colloid goitre were found. Most of the acini were rather small, but many of them were much enlarged and all were filled with colloid material. In some regions there was considerable connective tissue. (Fig. 1.)

The patient was seen some time later. The scar was entirely covered by the dress. It reached on the left side below the sterno-clavicular articulation; on the right side it was on a level with that joint. The voice was normal.

Local anæsthesia as used by Kocher in goitre operations cannot become popular in this country, where people are more susceptible to shock. The peculiar temperament of a people is important in this respect. In Germany Dr. Ross saw an enormous sarcoma of the kidney removed by Israel under local anæsthesia with practically no influence on the pulse and respiration. The fright of so severe an operation as thyroidectomy would result in greater shock. Even the slight operations are attended with some discomfort.

The advantage of the method was that articulation by the patient aided the surgeon in avoiding the external laryngeal nerve. The present case demonstrates that this disaster can be avoided by careful manipulation. Accident may result from an anomalous situation of the nerve, but we have never seen the nerve so situated.

Fig. 1.—Drawing of slide (low power) of Dr. Deaver's case of cystic goitre.

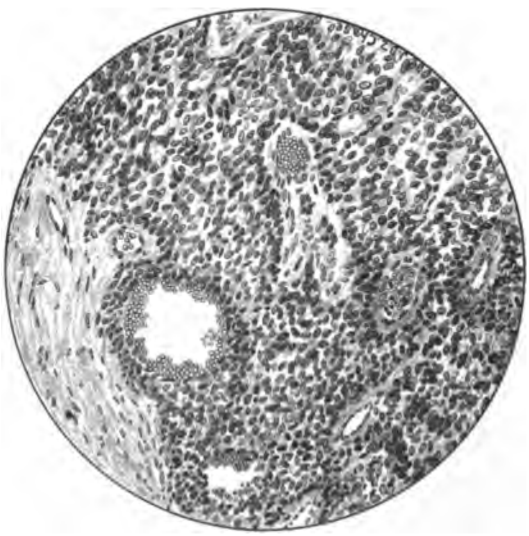

Fig. 2.—Drawing of slide (medium power) of Dr. Deaver's case of sarcoma of the forearm.

SARCOMA OF THE BONES OF THE FOREARM.

L. G., aged nineteen. Family history negative, no "tumors" having existed in any member of the family. The patient had the milder diseases of childhood, also scarlet fever. Has generally enjoyed good health, with the exception of slight attacks of rheumatism. About a year prior to admission a swelling appeared on the left forearm. There was aching pain, but not of a severe character. There was no sense of weight to the forearm. Patient used the arm, but was annoyed by the size and appearance of the forearm.

Examination revealed a spindle-shaped swelling of the left forearm, occupying the entire middle third, the growth being six inches long and fifteen inches in circumference. The skin was tense and shiny, but there was no tenderness on palpation.

Amputation was performed through the lower third of the arm by the bloodless method, with anteroposterior flaps. The usual aseptic dressing was applied, without drainage. The wound was dressed on the eleventh day and all stitches were removed. The wound healed by first intention. The patient was discharged on the twenty-first day.

Microscopic examination of the tumor showed it to be composed of cells maintained in apposition by intercellular substance, but without stroma. For the most part the cells were round or oval and rather large; some of them, however, were more elongated and others irregular in shape. There was a fair amount of protoplasm. The growth was extremely vascular, the blood-vessels consisting in general of but a single layer of endothelium. In many areas more or less extensive hemorrhages had occurred; in others there was some retrograde metamorphosis. (Fig. 2.)

INGUINAL COLOSTOMY FOR CANCER OF THE SIGMOID; EXCISION OF A PORTION OF THE SIGMOID.

S. F., a married woman aged forty years, a resident of Mississippi, suffered from a stricture of the rectum, which two surgeons decided to be due to malignant disease. On examination by rectal touch and by the sigmoidoscope, the growth was found to reach to within one centimetre of the anus and to involve about ten centimetres of the rectum. It did not extend above the promontory of the sacrum. The mass was situated too low to enable me to save

the sphincter in a radical operation, and therefore necessitated an inguinal colostomy.

Operation.—An incision about two inches in length was made, at the level of the anterior superior iliac spines, in the direction of the fibres of the external oblique muscle. Skin, fasciæ, and the aponeurosis of the oblique muscle were divided. The transversalis was separated, and its fascia and the peritoneum were lifted successively by forceps and divided during the inspirations of the patient. The sigmoid flexure was delivered and small gauze strips were placed in the wound. As the upper portion of the sigmoid was reposited, the lower end was drawn out and carefully inspected. Examination within the pelvis showed, on its floor and below the promontory of the sacrum, an indurated mass which involved the upper rectum and the lower sigmoid. The uterus was normal.

The surplus sigmoid was delivered through the wound and deposited on moist, hot gauze. The proximal portion was drawn out to deliver the redundant bowel above, in order that prolapse through the artificial anus should be less likely and to be as distant as possible from the malignant disease. The mesosigmoid was tied off by three silk ligatures. A piece of rubber tubing was passed through it beneath the bowel, and after the contents of the bowel above had been pressed into the lower end, the tube was lightly tied. A second piece was applied above to prevent escape of fecal contents. After gauze had been placed over the wound, the sigmoid was divided between the constricting bands. The assistant kept the upper end covered with gaüze to avoid any contamination of the wound. The lower end was trimmed and its walls were invaginated, to avoid any chance of leakage, because this end was to be returned to the abdominal cavity. Reinforcing Lembert sutures were inserted after the rubber tube was removed. Closure being complete, some appendices epiploicæ were removed after being tied off close to the bowel. The end of the bowel was then dropped back.

The redundant bowel above the upper rubber tube being drawn down, the mesentery was stripped back and cut with scissors. The vessels of the mesosigmoid at this point were controlled by the ligatures which had been applied early in the operation. The serosa of the bowel was stitched to the peritoneum around the incision, thus anchoring the gut in this situation and closing off the peritoneal cavity against infection. Interrupted sutures of fine silk

were used. The intestine having been stitched all around except below, it was lifted to demonstrate the degree of fixation obtained. The peritoneum was closed below and sutured to the serosa of the bowel, making complete closure. About three inches of the intestine, to the upper end of which the rubber tube was applied, remained out of the wound. This was raised and through-and-through sutures of silkworm gut were passed through the margins of the wound by a Reverdin needle, the sutures above and below the bowel transfixing its serous and muscular walls. These sutures were tied. The intestine was cut off close to the wound. The finger was introduced into the bowel to determine that the sutures had not entered the mucosa. Several interrupted sutures were passed through the skin and superficial fascia and the margins of the bowel, which were trimmed down by scissors.

Iodoform gauze was packed into the bowel and placed over it externally and surrounded by a ring of moist gauze. Loose dry gauze and absorbent cotton were massed over these and bound by a wide roller bandage which was fixed by adhesive strips.

The etherization being skilful, the patient quickly reacted, whereas there have been cases in which patients were two or three days in recovering from the effects of the ether with which they had been saturated. The accumulated mucus in the larynx of an over-anæsthetized patient has even necessitated interruption of the operation for the performance of tracheotomy.

Incision through the peritoneum, when there is any doubt as to its relation to the intestine, should be made during the inspirations of the patient, with the peritoneum lifted by forceps; the bowel is thus carried away from the point of incision.

As to the time for colotomy, or colostomy, surgeons differ. Many invariably do an inguinal colotomy previous to an excision of any portion of the rectum. In cases seen early, in which the growth is not too low, a modified Kraske operation is preferable. The mass is excised and the bowel anastomosed above the sphincter, without any preliminary colotomy. Several patients in whom from four to eight inches of rectum and sigmoid were resected have had no recurrence after several years and retain normal functions of defecation. This is an ideal result, so far as the term can apply to an operation for carcinoma. If the malignant condition necessitates the sacrifice of the sphincter, a permanent inguinal colotomy may

be made and extirpation of the bowel can be done by a modified Kraske operation.

The methods of the operation should be adapted to the individual case. Under certain circumstances there is nothing better than complete section of the bowel. This method would not apply, however, to the cases in which removal of the intestine below the colotomy is impossible, since the discharges of the malignant growth would accumulate within the bowel. One objection to the Kraske operation is that the injury to the inferior mesenteric vessels and their large branches may give rise to violent bleeding and death of the patient from shock. In removing the portion of the sacrum great care and despatch are necessary to avoid undue bleeding from these vessels by getting them quickly under control.

The peritoneum will become sealed off in two or three hours. The wound can then be dressed without risk of contamination of the peritoneum by the fecal discharges.

After the operation there was no leakage. The bowels moved twice daily after the third day. Patient was discharged on the seventeenth day, the artificial anus being under some control. Microscopic study of the specimen showed the tumor to be an adenocarcinoma. (Fig. 3.)

DOUBLE FEMORAL HERNIA.

F. H., female, white, aged thirty-four, was operated upon several years ago in this hospital for strangulated femoral hernia. Later she had double femoral hernia, that of the right side being well marked.

Strangulated femoral hernia is relatively frequent in women; in middle life umbilical hernia is more common; inguinal hernia rarely occurs in them. Both incipient inguinal hernia and femoral hernia present a tumor above Poupart's ligament and must be carefully differentiated. The direction of femoral hernia is downward, forward, and upward. As the hernia emerges through the saphenous opening, it stretches its margins upward and comes in relation with Poupart's ligament and the skin. Reduction is accomplished by flexion and adduction of the thighs, in order to relax the superior cornu of the saphenous opening, and by manipulation downward, backward, and upward. In both conditions the tumor is bubo-like, —a bubonocele.

FIG. 3.—Drawing of slide of Dr. Deaver's case of adenocarcinoma of the rectum.

FIG. 4.—Drawing of slide (medium power) of Dr. Deaver's case of adenocarcinoma of uterus.

Before beginning an operation for hernia the limbs should be relaxed, separated, and free from all constriction, so that the operator may command their position at any time. In corpulent subjects the landmarks are obscured, and by manipulation of the limbs it is advantageous to relax or make tense the fascial structures and thus definitely outline them.

Operation.—The patient was in the horizontal position, the legs being slightly separated and unconfined by coverings.

Incision was made beneath the inner two-thirds of Poupart's ligament and carried through the skin. The long saphena and its tributaries in the groin were seen. The superficial pudic and the superficial epigastric veins were clamped and divided. The inferior falciform process of the saphenous opening at the inferior cornu was exposed; the superior process was uncovered by dissection with the handle of the scalpel. When the sheath of the femoral vessels was found its anterior layer was grasped by forceps and incised. As the sac was opened, the septum crurale and the preperitoneal fat, constituting the so-called fascia of Cooper, protruded internal to the vessels. The sac was grasped by forceps and tied off carefully with catgut, to avoid including the bowel, and the surplus was cut away. Retractors having been placed on the wound, the vessels were tied. Two sutures of kangaroo tendon were passed by a curved needle through the pectineal fascia, through Gimbernat's and Poupart's ligaments, and through the superior falciform process and Gimbernat''s ligament. The wound was closed by interrupted sutures of silkworm gut.

On the right side the operation was similar, except that drainage was introduced.

The wounds were dressed with gauze moistened in a solution of bichloride of mercury, dry gauze, and thick gauze pads. These were fixed by adhesive strips and bound with a roller bandage arranged in a double spica, the patient being raised by a block beneath the sacrum.

The tubes were removed on the sixth day and the stitches on the ninth. The wound healed well. The patient was discharged on the twenty-third day, with a slight granulating wound.

Pathological examination of the sac removed from the right side of the abdomen was most instructive. The walls of the sac were thick and indurated and showed bands of adhesion. The hernia was

evidently an old one,—probably a recurrence of that previously operated upon. The sac was then tied, but a new sac afterwards formed.

The methods of closing the canal are many. The sac may be tied with Gimbernat's ligament and the tissues sutured, as in this case. Closure cannot be absolute, owing to the presence of the saphenous vein. Through inflammatory adhesions the canal is occluded. Or, the sac may be folded after being tied off and anchored by transfixing Gimbernat's ligament. The aponeurosis of the external oblique muscle may be transfixed and the sac anchored at that point, after the manner of Kocher, who uses this method also in inguinal hernia. A flap of fascia of the pectineus muscle has been dissected up and sutured over the canal.

RESECTION OF A RIB FOR EMPYEMA.

G. B., male, white, aged twenty-three years, had a right empyema following a pleuropneumonia of that side. On physical examination, there was resonance above the right nipple anteriorly and in the axilla, with dulness on percussion below the nipple.

Empyema may be due to conditions within the lung, as tuberculosis and pleuropneumonia, or to trauma from without with infection of the wound. A surgeon should make it a rule to aspirate preliminary to resection of a rib for empyema, just as he uses a stone-searcher before beginning lithotomy. The only absolute sign of empyema is the presence of pus in the aspirated contents of the chest-cavity.

Operation.—The aspirating needle was introduced through the seventh interspace midway between the sternum and the spine. Pus flowed freely. An incision about three inches in length was made beneath the sixth rib at the anterior axillary fold. The skin was reflected and the intercostal muscles were removed. The under border of the sixth rib was exposed. A flat metal separator was passed beneath it and the rib was divided by bone-pliers. The pus escaped freely. The rib was divided one inch behind the first incision and the excised portion was removed. A wide drainage-tube was passed just within the chest-wall and fixed by a suture. The wound above and below was closed by interrupted sutures of silk-worm gut. The chest was washed with a bichloride solution, and

dressings of iodoform gauze, loose sterile gauze, and absorbent cotton were applied and fixed by a roller bandage.

The patient did well, the lung expanding slowly, He left the hospital on the thirty-first day, with a slight discharge.

VAGINAL HYSTERECTOMY FOR INCIPIENT CARCINOMA UTERI.

Mrs. P., white, had previously undergone an abdominal operation for hæmatocele and ovarian cyst.

Operation.—Ether anæsthesia, followed by oxygen inhalations. The patient was in the lithotomy position upon the upper segment of the Trendelenburg table, the thighs being supported by nurses. The external organs and the vagina were irrigated with sterile water. A Sims speculum was introduced. The anterior lip of the cervix was caught with a tenaculum and the uterus was brought down. With a straight needle grasped by a hæmostat and guided by the finger of the left hand, a silk ligature was passed, from behind forward, through both lips of the cervix. The portion between the lips was brought down by a tenaculum, cut, and the ends of each segment tied together so as to form on each cervical lip a loop by which traction could be conveniently maintained. Two metal retractors were applied laterally to the vaginal walls and held by the nurses supporting the thighs. The uterus being drawn downward by the loops, an anterior incision was made at the cervicovaginal junction. With forceps and scalpel careful dissection upward was made, forceps being clamped upon the vessels. By the finger covered with gauze, the bladder and ureters were carried upward and forward to avoid injury in the dissection. A similar incision was made on the cervical wall posteriorly, and with the aid of scalpel on finger the dissection was carried towards the fundus, and the posterior cul-de-sac opened. Lateral cervical incision was then made, and by careful dissection the left uterine vessels were exposed, caught with hæmostatic forceps, and tied. The vessels on the right side were secured in the same manner. A third metal retractor was then placed beneath the anterior vaginal wall and the base of the bladder. The anus was covered with gauze. By long straight scissors the dissection was carried high posteriorly. With the finger covered with gauze, the anterior and lateral walls were freed. The bleeding was controlled by hot gauze packing. A silk ligature was passed by a pedicle needle high up on the left side and tied. A similar ligature

was inserted on the right side. The uterus was brought to the vulva by traction and cut free. The wound was well irrigated and sponged, bleeding vessels being grasped by long hæmostatic forceps. From dilated and tortuous veins of the broad ligament and from the vaginal walls there was considerable hemorrhage, which was controlled by tight packing with iodoform gauze, the forceps remaining *in situ.* Dressings of gauze and cotton and a perineal bandage were applied.

Examination of the extirpated uterus showed that it was normal in size and shape. The cervix was congested and somewhat enlarged, but otherwise revealed no abnormalities. Just inside the internal os there was an ulcerated area about one centimetre in diameter. This upon microscopic examination proved to be a glandular carcinoma, involving to a slight extent the uterine wall. (Fig. 4.)

Removal of the ovaries in malignant uterine disease is good practice, because of the local anatomical relations. Extirpation of these organs does not in any way influence the malignant pelvic condition. The local disease will become constitutional by extension through the lymphatics, and oophorectomy will not retard the process.

In carcinoma of the cervix operation will have little effect upon the malignant condition unless done early. It is probable that careful statistics will show the result of hysterectomy by the abdominal route to be more favorable than by the vaginal method.

EXSECTION OF THE LEFT LINGUAL NERVE.

J. C. S., male, white, aged sixty-four years, had a neuralgia of the left side of the tongue, for which the left lingual nerve was excised. There was no evidence of carcinoma.

This makes the second case for which we have done this operation in twenty years' practice. The majority of lingual neuralgias in persons beyond middle life are due to carcinoma. The first patient, a woman, believed that she suffered from carcinoma. There was, however, no sign of such condition,—neither hypertrophied papillæ, superficial ulceration, nor induration. The pain was reflected from the tongue to the temporal region by the auriculotemporal branch of the inferior division of the fifth nerve, to the ear by the chorda tympani, and to the teeth of the lower jaw through the inferior dental branch of the inferior division of the fifth nerve.

We exsected a portion of the lingual nerve of that side, with permanent cure of the neuralgia.

The results of operative treatment for neuralgia are much the same as those in cases of epilepsy. In the latter condition operation in our experience is futile. Early Jacksonian epilepsy does indicate operation, but not with the promise of permanent relief.

We recall a case which we operated upon for Dr. Lloyd at the Philadelphia Hospital. Ferrier, and Victor Horsley, who were then travelling in this country, did us the honor to pronounce the result the most remarkable that they had seen up to that time. The irritation was localized in the centre controlling the right great toe. We trephined over the leg centre on the left side, turned down a large flap of bone, opened the dura, outlined the limits of the leg centre on the cortex by electrical current, and then completely excised the gray matter in these limits. The result was a monoplegia of the right lower extremity and apparent cure of the epilepsy. Power was recovered, however, and with return of function the epilepsy recurred. The operation was repeated, with a similar result.

In surgical interference for neuralgia of the fifth nerve the same principle has been established. Even after the removal of the Gasserian ganglion recurrences of the neuralgia are now being reported. Hence exsection should be begun on the peripheral branches of the affected nerve and the deep trunks attacked as the neuralgia recurs. In one case of trifacial neuralgia there was a history of seven operations being done. Each neurotomy was followed by a period of from eighteen months to two years in which the symptoms disappeared. At the last operation, the pterygoid region was opened and the inferior division of the fifth nerve at the foramen ovale excised. The patient was relieved of the neuralgia during her last days.

With temporary relief of the symptoms following successive operations advancing from the periphery, the life of the patient may be prolonged many years. Resection of the Gasserian ganglion is perilous to the patient and is not an absolute cure. Hence it is to be avoided as long as possible.

Operation.—The patient was in the horizontal position, the head being raised and supported on a flat pillow.

A mouth-gag was introduced on the right side. The tongue was grasped by a tenaculum and drawn to the right. The left lingual nerve was felt beneath the mucous membrane. Incision was through

the mucous membrane beneath the second molar tooth of the lower jaw. A small piece of gauze was placed at the side of the tongue and the nerve was hooked out by an aneurism-needle. The nerve was grasped by hæmostatic forceps and about three-quarters of an inch was excised. Sterile gauze was introduced to control the bleeding.

The patient left the hospital on the fourth day, the neuralgia having disappeared.

EXCISION OF A WEN.

C. G., male, white, aged forty-two years, was operated upon recently by amputation at the shoulder for a sarcoma above the left elbow. The mass was ulcerated and the glands of the axilla were enlarged; these were cleaned out.

The usual teaching that sarcoma extends by way of the blood-stream and carcinoma by lymphatic distribution is correct in the majority of instances; but there are atypical cases in which sarcoma is disseminated by the lymphatics, as in this case, or carcinoma by blood-channels.

The prognosis is, of course, unfavorable, but the patient has not been informed of the fact. He was troubled with the idea that his wen is of the same nature as the tumor for which amputation had been done. To quiet his fears we promised to excise the sebaceous cyst.

Operation.—No anæsthesia; horizontal position. The hair was shaved from the head for a distance of one inch around the tumor. The skin was washed with bichloride solution. Incision was made over the tumor; the cyst contents escaped and the cyst-wall was turned out by the handle of the scalpel. The cavity was washed. The wound was closed by two interrupted silkworm-gut sutures.

The stitches were removed on the eighth day, the wound having healed by first intention.

SPLENECTOMY FOR MALARIAL CACHEXIA.

CLINICAL LECTURE DELIVERED AT THE ROYAL UNIVERSITY OF BUCHAREST, ROUMANIA.

BY PROFESSOR THOMAS JONNESCO,

Professor of Surgery at the University of Bucharest.

Gentlemen,—You are all familiar with malarial cachexia as we see it here in Roumania. The terrestrial conditions along the lower Danube are in many places very favorable for the production of repeated infection with the malarial parasite. The condition of our poorer classes, with the lack of proper treatment during the primary acute stage of malarial fever, the absence of proper nourishment and care, and the necessity of working for their daily bread that compels many patients to continue their occupations or to resume them at a time when they should be under rigorous treatment, gives rise to many cases of chronic malaria that eventually result in malarial cachexia.

You know the general appearance of these patients. They lose in weight, they take on a sallow, wizened look, the skin becomes waxy pale as the cachexia becomes worse, and they suffer from severe nervous symptoms. All the important organs of the body are sympathetically involved in the degenerative process due to the long-continued presence in the system of malarial poison. The stomach loses its digestive power, and so the appetite fails. The intestines lose their absorptive power, peristalsis suffers, and alternating conditions of constipation and diarrhœa ensue. The nervous mechanism of the heart, perhaps even the heart muscle itself, becomes involved, and severe cardiac palpitation becomes one of the most discomforting symptoms of the disease. The respiratory apparatus is affected: the sufferers get out of breath after very little exertion and are liable to constant acceleration of respiration that is of itself a source of fatigue. The muscular system suffers profoundly. The patients become tired very easily, occupations involving severe labor have to be given up, and in poor, necessarily hard-working people the condition goes on inevitably from bad to worse.

Even in the early stages of the affection there are serious general symptoms that often cause considerable disturbance of nutrition. Patients suffer from coated tongue, constant bad taste in the mouth, loss of appetite, a sense of gastric fulness that is oppressive and further interferes with the taking of food, besides which there is, on very slight provocation, severe belching of gas or even vomiting. Often the diarrhœa is very obstinate to treatment and takes on a dysenteric character. The symptoms in the nervous system are frequently very marked, and a tremor that is almost choreic in character or paretic conditions, slight convulsive seizures, or contractures may be noticed. Severe psychic disturbance is also not an infrequent accompaniment of malarial cachexia.

In severe cases of malarial cachexia the liver and spleen are always enlarged. The spleen especially is prone to become so hypertrophied that it fills a large part of the abdominal cavity. It may extend as far down as the umbilicus and as far forward as the median line. Still larger spleens, reaching to the anterior superior spine and admittedly due to the malarial cachexia, have been seen. Only of late years has it been demonstrated that splenic hypertrophy is of itself an important factor in the production of the symptoms which are ordinarily known as malarial cachexia. The enlarged organ has now been removed in over one hundred cases, and we are in a position to affirm with confidence that splenectomy is the radical cure for malarial cachexia and that it is the only method of treatment which produces any favorable effect upon this very serious and obstinate condition.

You all know how intractable malarial cachexia is to any ordinary medicinal treatment. Quinine seems to have no effect upon the cachectic condition which has resulted from the chronicity of the malarial poison. In individuals of the better class—that is to say, those who have the means to take proper care of themselves—there is a possibility of making life reasonably livable by change of climate and long years of sedulous valetudinarianism. For the great majority of those who suffer from malarial cachexia the only relief is by splenectomy.

I propose to show you this morning some patients on whom the operation of splenectomy was performed, and to tell you of its technique, of the complications that may be looked for, and of

the results that I have had from this method of treatment in the last five years.

The early personal history of this woman of twenty-two is not of very great interest. She seems to have had the ordinary diseases of childhood and at the age of twelve suffered from smallpox. She was married at fourteen years and a half, though her menses did not appear until some six months afterwards, when she was a little more than fifteen years of age. The first flow lasted for three days, with only the usual loss of blood and without pain. Since then, except during pregnancy, her menstruation has been regular and her menstrual life has been without incident. Two years after her marriage she had a child, which lived for six years.

Two years ago the patient contracted malaria, and, owing to neglect of treatment, suffered almost continually from intermitting attacks of fever for about nine months. Her febrile attacks often lasted for considerable periods, and sometimes recurred at intervals of two or three days and then gradually became more infrequent. The chills usually took place in the afternoon and ordinarily lasted until night; sometimes, however, they commenced in the morning and ceased during the course of the afternoon. The malaria was of that atypical irregular form which is especially prone to produce cachexia.

After the patient had suffered for several months from her malarial attacks she noticed a tumor about the size of a closed hand in the left hypochondriac region. Since the development of this hard lump, as she calls it, these attacks of fever recurred less frequently but lasted longer than before, and sometimes she suffered from continuous fever for a week. The tumor in her left side continued to enlarge.

Whenever a febrile attack corresponded with the period of menstruation, this function was apt to be disturbed. The flow increased in amount and she suffered from exhaustion afterwards. Later she noticed also that the intervals between her menses became less and less until her periods returned every three weeks and then even oftener and became more and more painful.

On the day the patient came to the hospital she had an attack of fever which began in the evening and lasted during the night. The temperature was not very high, however, and seems not to have gone above 101° F.

Notwithstanding the tumor which the patient had noticed for several months, she had not had very much discomfort in the splenic region except at certain times. During the menstrual period there was always a heavy dragging feeling that added much to her fatigue and occasioned great disinclination for work. Attempts to lace herself in a corset or to wear anything tight around her waist were always followed by serious discomfort. Whenever she attempted to walk for any distance, the dragging ache in her side made it difficult for her to prolong the effort. After her meals she always felt a sense of oppression and constraint in her left hypochondriac region.

Despite her chronic malaria and the enlargement of the spleen, which from her history we felt sure must exist, her general condition was not unsatisfactory. She was somewhat anæmic: her mucous membranes were rather pale and sclerotics slightly icteric. There was nothing in the lungs; there are good reasons for carefully examining them before undertaking any operation upon the spleen. Examination of her heart showed the presence of a murmur synchronous with the first sound, best heard at the apex of the organ. This murmur was evidently not due to a valvular lesion of the heart, but was of extracardiac origin dependent on her somewhat anæmic condition. It was blowing in character, and loudest when the patient was lying down. It was indistinct and at times even disappeared completely when she stood up. Percussion over the liver showed that organ to be of about normal size, with liver-dulness certainly not increased.

The abdominal interest centred in a tumor filling the left hypochondriac region and even extending beyond it in most directions, being felt two or three finger-breadths beyond the median line and descending more than a hand's breadth below the umbilicus. Its internal edge presented a distinct characteristic of a splenic tumor; its lower edge was a straight transverse line; its external border was lost in the tissues of the flank on the left side. Above the tumor could not be limited except by percussion and it filled almost completely the interval known as Traube's space. The tumor was rather hard and on light percussion gave a distinctly dull note over its whole area. Deeper percussion brought out the tympanic resonance of the intestine which it covered, showing that the tumor was not very thick. Its surface was irregular, quite

smooth, and absolutely without coarse granulations. The tumor seemed to be nearly square, with its upper border somewhat convex. Deep breathing produced distinct movements of the tumor, but its position was not affected by gentle respiration. On palpation, the tumor proved to be relatively mobile, especially in the transverse direction; its mobility up and down was much more limited, although when the patient stood on her feet it was displaced slightly downward. Its pedicle of attachment to the diaphragm seemed to be rather short. The circumference of the abdomen at the level of the umbilicus was eighty-nine centimetres (about thirty-six inches).

The patient's urine was of about average quantity, of normal color and specific gravity, and without a trace of sugar or albumin.

About two weeks after her admission into the hospital the patient was treated by laparotomy, the incision being made above the umbilicus in the median line. My experience in splenectomy justifies me, I think, in declaring that this is undoubtedly the best route for accomplishing the removal of the spleen most easily and with least danger. We found in this case some adhesions to the vault of the diaphragm, but had not much difficulty in separating them. We were able to make a good pedicle and to tie off the splenic vessels with assurance and without loss of blood. The abdominal wound was closed with silver wire and the skin was brought together with fine catgut sutures.

The spleen proved to have been greatly enlarged. Its weight was thirty-three hundred and fifty grammes (about seven pounds). It was thirty-one centimetres (about twelve inches) long, fourteen centimetres (nearly six inches) in breadth, and sixteen centimetres (about six and one-half inches) thick at its greatest diameter, and five centimetres (about two inches) towards its edge. On the lower part of its external surface was a white patch of perisplenitis measuring two finger-breadths in one direction and three finger-breadths in the other. Over this arises a series of thin membranous coatings evidently of inflammatory origin, but rather resistant to efforts to tear them. The hilum of the spleen presented nothing remarkable and the vessels entered the splenic parenchyma at two principal points.

Although our patient bore the operation very well and her previous condition had been satisfactory, the after-course of the case

was not without incident. The complication that ensued in her case so commonly follows splenectomy that we rather expect to have to carry our patients through it. On the evening after the operation an intense bronchitis began to develop and her temperature rose to about 39° C. (102.1° F.). Dry cups were used, and next morning the temperature fell a little, but in the evening went up to 39.4° C. (103° F.). Physical examination of the patient showed that the inflammation affected not only the larger bronchi, but had also spread into the smaller ramifications of the bronchioles and had lighted up a true capillary bronchitis. The dyspnœa became very marked and expectoration was extremely difficult. Again dry cups (ten) were applied, with subsequent scarifications. During the night the dyspnœa became extreme, the face was deeply cyanosed, and for a short time the patient lost consciousness. Ten wet cups were applied over her back and inhalations of oxygen and injections of ether and caffeine were resorted to. The patient regained consciousness after these vigorous measures and the dyspnœa became much less marked.

Next day the temperature was lower, but the treatment, especially by inhalations of oxygen, was kept up. The bronchitis got better, the expectoration became more easy, and the sputum was fairly plentiful and mucopurulent in character. On the following day the temperature was down nearly to normal and the patient felt much more comfortable. The bronchitis rapidly diminished and the temperature continued normal.

Ten days after the operation the dressing was removed from over the abdominal incision, and union was found to have taken place by first intention. The silver wire sutures were removed. At this time the general condition of the patient was very good. Her appetite was better than it had been for a long time and her general appearance was brighter and more satisfactory.

Examinations of her blood showed that before the operation there were three million three hundred and twenty-five thousand red and sixty-two hundred and fifty white corpuscles, the proportion of whites to reds being one to five hundred and thirty-two. The amount of hæmoglobin as measured by a Gowers hæmoglobinometer was sixty-five per cent. After the splenectomy the number of red blood-cells was three million seven hundred and twenty thousand, the number of white cells fifteen thousand, and the pro-

portion of whites to reds was one to two hundred and forty-eight. The hæmoglobin, estimated as before, was eighty-five per cent. The condition of her blood continued to improve while she was in the hospital, and when, six weeks after the operation, she was discharged, there were four and a half million red blood-cells and about ten thousand white cells.

Ever since the removal of her spleen, nearly a year ago, the patient has continued in excellent health. Her blood is now practically normal, there being about four million seven hundred thousand red blood-cells and between eight and ten thousand white cells. Her appetite has continued good and she has not suffered from the previous recurrent relapses of malarial fever. Menstruation, which for some time before the operation was a source of severe discomfort to her, is now painless. The tendency of the flow to appear oftener and to be more plentiful has ceased and her periods return regularly every twenty-eight days. Splenectomy in this case has certainly been of the greatest service to the patient and a source of profound satisfaction to the surgeon.

I have here another patient from whom an enlarged malarial spleen was removed more recently. This patient also suffered from recurring attacks of fever, from discomfort in the region of the spleen, and from many of the symptoms of malarial cachexia which are so severe and so obstinate to treatment. All medical means had been exhausted and it seemed that surgical intervention offered the only reasonable hope of relief from a serious condition.

A spleen weighing over six pounds was removed rather easily through the median incision, and the pedicle was tied off without any serious hemorrhage. In this case there were no serious sequelæ in the lungs. General improvement set in almost immediately after the operation, and now, nineteen days later, the patient is distinctly better in every respect.

Before the operation in this case the number of red blood-corpuscles was about three million five hundred thousand, the number of white cells seven thousand eight hundred, and the proportion of whites to reds one to five hundred. Twenty-four hours after splenectomy there were four million five hundred thousand red cells and ninety-three hundred and seventy white cells, the proportion of whites to reds being about one to four hundred and

seventy. One week after the operation the number of red cells was about four million, the number of white cells thirteen thousand, and the proportion of whites to reds one to three hundred and nine. It will be seen that the number of red cells increased immediately after the operation and decreased a little later. Later the number of white cells also diminished.

In both of these cases a very interesting observation was made with regard to the toxicity of the urine. After the operation in the first case the coefficient of toxicity of the urine was distinctly less than it had been previously. In the second case, as the result of an attack of fever, the urine became markedly hypertoxic, but this diminished later and the general toxicity of the urine became less than it had been before the operation.

During the last five years I have done thirty-two splenectomies, twenty-eight of them for enlarged malarial spleen. Of these twenty-eight patients twenty have lived. This experience justifies me in formulating certain conclusions with regard to this operation. As a general rule, when the spleen is enlarged because of continuous contact with malarial poisons and has become an evident source of chronic malarial symptoms and the active agent in the production of malarial cachexia, it should be removed. There are, however, certain contraindications to its removal that must be borne in mind.

When the question of splenectomy comes up, the most important consideration is as to the condition of the patient's liver; if there are any symptoms of atrophic cirrhosis of this organ, the operation should not be undertaken. When chronic malaria has existed for a long period, malarial hepatic cirrhosis is a common complication. It is well known of late years how closely associated the liver and the spleen are in their pathological conditions. Hepatic cirrhosis practically never occurs without enlargement of the spleen. Most malarial enlargements of the spleen, however, occur without involvement of the liver, but the possibility of this complication must always be borne in mind and a careful diagnosis of the hepatic condition made before deciding on splenectomy.

The next important contraindication is the existence of too extensive parietal adhesions. These render extirpation of the spleen extremely difficult. Considerable blood is necessarily lost not only during the operation, but the avoidance of secondary hemorrhage

and of large postoperative oozing is sometimes impossible. Such adhesions may usually be detected by testing the mobility of the spleen in the transverse direction and noting its up and down movements with respiration and its tendency to sink lower in the abdomen when the patient stands up.

The third contraindication is the presence of a very large ascites. This gives rise to such disturbances of intra-abdominal pressure and so interferes with the abdominal circulation that splenectomy is more difficult to perform, and the functions of other viscera have usually been so much disturbed by the increased intra-abdominal pressure that recovery after the operation is much less likely to occur.

The existence of pleurisy in any form is usually an absolute contraindication to splenectomy. One of the most frequent sequelæ of the operation is a serious (often a capillary) bronchitis. This seems to be due in part to the altered respiratory rhythm produced by the removal of the very large spleen which had been lying just below the diaphragm and hampering its movements. If there has been any serious lung trouble just before the operation, it is prone to be much exaggerated immediately afterwards, and patients may be lost in this way.

The fifth contraindication for splenectomy is a considerable lowering of the patient's nutrition, especially if this cachectic stage be accompanied by visceral lesions, such as pathological conditions of the liver or kidneys. While we do not know the exact function of the spleen, there is no doubt that it exercises an important influence on the general health. The normal system rather easily accustoms itself to the absence of the spleen. When there are, however, hepatic or renal lesions, the system does not seem to be able to compensate so readily for splenic function, and the result may be the loss of a patient after a successful splenectomy.

Slight hypertrophy of the liver, a medium amount of ascites, or even a pronounced degree of malarial cachexia is not a contraindication to splenectomy when other conditions are favorable. Advanced age also does not prohibit the operation: I performed splenectomy successfully on a patient of seventy years. Large size of the spleen is not a serious contraindication: I have removed spleens weighing over ten pounds, without serious sequelæ and with complete recovery of the patients. When the organ has become

large, splenectomy should be done as soon as possible after medical treatment has shown itself powerless to give relief.

The presence of slight leucocytosis does not preclude the operation. The leukæmic condition is, however, an absolute contraindication, even when the general condition of the patient seems quite satisfactory and the leukæmic spleen is not of very large size. I have thrice operated for leukæmic enlargement of the spleen and have lost all three of the patients. The operations were not followed by any special complication, but the patients fell victims to the uninterrupted progress of the leukæmic state. The impression produced was that in no one of the cases had the serious operation been of the slightest service to the patient.

The operation of splenectomy is easier and is less liable to serious results the greater the mobility of the spleen. When the organ is fixed, even though there be no extensive adhesions, hæmostasis is difficult. Fixity of the spleen, however, without the presence of numerous adhesions, is not in itself a contraindication; the operation is much more difficult, but is not impossible.

The most common postoperative complications are well illustrated by the history of the case that I have just given you. They occur in the lungs. Pulmonary congestion is not rare, and it may progress to the extent of pneumonic consolidation. Pleurisy is also a complication that occurs not infrequently. Pericarditis is another sequela that may be anticipated. Local secondary hemorrhage is probably the most common cause of death. There is, of course, some risk of peritonitis, which may, however, be precluded by thorough aseptic precautions. Personally, I have found that fine catgut sutures are amply sufficient to secure perfect hæmostasis, especially if the pedicle be tied off in two or three portions. These fine ligatures are much less likely to carry with them infective material.

In all my cases the urinary toxicity has decreased after splenectomy if the patients had an afebrile postoperative convalescence. This hypotoxicity is very marked and seems to persist: I have found it still present in patients even three or four years after the operation.

The therapeutic effect of the extirpation of the spleen in malarial chronic infection is a source of extreme satisfaction to the patient and the surgeon. The febrile attacks, though common before, en-

tirely cease. The general condition improves rapidly. The appetite is increased, the digestion is markedly improved, the tendency to palpitation disappears, and the nervous symptoms become less. The diarrhœic conditions, sometimes almost dysenteric in character, so common in malarial cachexia are completely relieved. The progress of the malarial cachexia, so marked before the operation and so hopelessly obstinate to all ordinary therapeutic measures, now ceases. Ascites that has lasted for years is definitely removed.

As to the duration of this improvement I am convinced that it is no passing incident, but a permanent cure. I have within the last few months seen four of the patients who were operated upon more than three years ago, and the transformation effected in them is marvellous and has continued ever since the operation.

After splenectomy in very anæmic cases the number of red globules rapidly increases from two or three million to five million and over. The number of white blood-cells, after a passing increase which immediately follows the operation, returns to normal during the course of hospital convalescence. This is true even where there had existed a slight leucocytosis before the surgical intervention.

In conclusion I may say that when there are no other serious organic disturbances splenectomy should be proposed to every patient who has enlargement of the spleen due to chronic malaria, provided it does not yield to ordinary medical treatment. The progress of the malarial cachexia is constant, and the removal of the spleen should be undertaken in order to avoid the development of the serious lesions of the liver which soon constitute an absolute contraindication to splenectomy and make the patient's pathological condition hopelessly progressive. When the spleen has increased in size, attacks of perisplenitis are apt to occur which cause adhesions between the organ and the abdominal walls. Each new set of adhesions makes the safe extirpation of the spleen more and more difficult. The operation should not be delayed too much, then, and the best results, with least danger to the patient, are obtained in cases of medium enlargement.

SUPRAHEPATIC LIVER ABSCESS.

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ACCORDING to the situation of pus in the neighborhood of the liver, I ventured, some three years ago, to classify hepatic abscesses under three headings,—(1) suprahepatic abscesses, (2) intrahepatic abscesses, and (3) infrahepatic or subhepatic abscesses. This classification is coming into general use, and the term "suprahepatic" abscess is to be met with in most accounts of the disease nowadays. The classification, although for the most part a technical one, yet serves a useful end, if only by its adoption the subject of the presence of pus in or around the liver is studied more closely and an attempt at differentiation seriously made. But the separation of liver abscesses into groups betokens more than a mere technicality, and proof is gradually accumulating that in their etiology and pathology the several abscesses have a distinctive character. What I particularly insist upon is the recognition of the suprahepatic abscess as a specific form of the disease; once that is established, a clinical step in the advancement of our knowledge will have been taken, and a great factor in the matter of treatment placed upon a scientific basis.

Synonyms.—The term "suprahepatic abscess" is *not* synonymous with what is known as "subdiaphragmatic abscess;" the latter is in no way related to the former, having nothing in common except that both are in contact with the diaphragm. Instead of using the word "suprahepatic," the terms "abscess of the dome of the liver" and "abscess at the back of the liver" have been employed by the writer at times, but merely as explanatory terms. A study of the definition of this specific form of abscess shows that none of the alternative terms are synonymous with the idea which it is intended to convey by "suprahepatic."

Definition.—By a suprahepatic abscess is meant the formation of pus between the layers of the broad ligament of the liver. The

boundaries of this collection thus consist of (*a*) the peritoneum, limiting the space between the layers of the broad ligament circumferentially, (*b*) the liver below, and (*c*) the diaphragm above. The affection may be unattended by previous hepatitis, dysentery, or any other evident abdominal ailment. It is characterized by a sudden onset, symptoms of fever, cough, and some respiratory distress, and, when allowed to pursue its course spontaneously, usually terminates by the pus finding its way through the diaphragm and lung to a bronchus, from which the purulent matter is expectorated.

Remarks.—It will at once be evident that this is not a true hepatic abscess; it has primarily little or nothing to do with the liver tissue; it may arise independently of any antecedent inflammation of the liver; it may run its course without giving rise to enlargement or even tenderness of the liver; its genesis is independent of dysentery, although hepatitis and intestinal flux may develop during its course. In fact, it is that form of so-called "liver abscess" which arises independently of dysentery.

Etiology.—We speak of tropical liver abscess as though it were a definite disease; as though all inflammatory troubles in connection with the liver which end in pus were to be considered as occupying a definite niche in our nomenclature. This I regard as wholly unscientific and against clinical experience and pathological evidence.

Dysentery plays no part—not even, as far as is known, a secondary part—in the pathology of suprahepatic abscess, nor is it ushered in by hepatitis. The commonest cause of suprahepatic abscess is "*a chill.*" Just as acute pneumonia is consequent upon a chill in temperate climates, so is inflammation in the region I have defined a common sequel to chill in the tropics. In several cases of abscess of this nature that I have met with, the disease rapidly followed a chill. A typical example will suffice.

A man, aged twenty-eight, took part in athletic sports in Hongkong, during the month of January, when the temperature in the sun is high and a rapid fall begins as soon as the sun goes down. He did not change his clothes after perspiring freely, and within twenty-four hours he was seized with what appeared to be sharp pleuritic pains in the lower part of the right chest. A careful examination of the lung and liver threw doubt upon the pain being due to pleurisy or hepatitis, and I diagnosed inflammatory trouble, with effusion between the diaphragm and the liver. I localized the

situation of the lesion from previous clinical and pathological experience of similar affections, and from evidence of effusion and swelling as elicited by percussion in the right suprahepatic region. As evidence of my confidence in my diagnosis I telegraphed to the patient's brother in Formosa, "that his brother had an abscess of the liver and was seriously ill." This diagnosis proved to be absolutely correct, although before the telegram was sent the patient had been sick only forty-eight hours. I mention these facts to show that it is possible to diagnose this ailment as a distinct affection almost from the onset. Pus may not have been—in all probability was not—present at the period of my first examination, but a collection of "inflammatory fluid" was certainly present, as evinced by the local symptoms and subsequent history. The man was an officer on a Chinese customs cruiser, had recently arrived from Europe, and had never had dysentery, malarial fever, or any tropical ailment. This case serves as a type of many others, in which a suddenly developed suprahepatic inflammatory effusion arises independently of dysentery or malaria and runs a course towards suppuration. What determines the signs and symptoms to be located in this region, instead of in the lungs or liver, will be considered later.

Anatomical Characters and Post-mortem Conditions.—The region to which I am calling attention is situated over that part of the liver which is destitute of peritoneum. Between the layers of peritoneum which pass from the liver to the diaphragm is an interval occupied by the superior vena cava, by the lymphatics passing from the upper surface of the liver towards the thorax, and by some small blood-vessels. The initial seat of the inflammation is in the lymphatics of this region,—those passing from the liver to the under surface of the diaphragm. Here a lymphangitis takes place, with effusion into the area, causing the liver to be pushed downward, the diaphragm to be pressed upon from below, and the anterior and posterior aspects of the space bounded by the peritoneum to bulge. Very early in the disease the local pain induces the patient to forbear using the lower part of the chest in breathing and to employ only the upper part of the thorax therefor. The lower lobe of the right lung, therefore, speedily becomes congested, and clinically, pulmonary symptoms in that region are set up. This tends to obscure the primary seat of the disease, and, unless the practitioner is careful, his attention may be wholly diverted to the lung symptom

—a congestion of the right base—to the neglect of the more serious complaint below.

The post-mortem appearances, gathered from seven cases in which I had the opportunity of observing them, are as follows: On opening the abdomen an inexperienced observer will be astounded to find that the liver, which he had regarded as the seat of the pus that had either been withdrawn by aspiration and drainage or had been coughed up from the lung, is healthy in appearance and normal in size. He will begin to doubt, as I have done, the correctness of his diagnosis, and, believing that after all the pus was located in the pleural cavity, will proceed to open the thorax. Astonishment is followed by perplexity when in opening the pleura the two surfaces appear quite healthy, and he turns again to the abdomen in quest of explanation. There is neither pleurisy, peritonitis, nor hepatitis to account for the signs and symptoms observed during life. A closer inspection, however, will disclose that the anterior walls of the broad ligament seem to bulge, and, on tearing or cutting it through, pus will escape and the seat of the abscess be determined. An examination of the cavity will show perhaps one, two, or more abscesses in the region. One, the large abscess, will either open upward through the diaphragm to a bronchus, or it may have been tapped previously. A second and even a third abscess may exist between the peritoneal layers, lying as small unburst sacs on the top of the liver. Before rupture they may attain any bulk from a hazel-nut to a walnut. When the floor of the abscess is examined, it is seen to rest on the liver substance; the capsule of the liver has disappeared, and the ulcerated surface looks as if quite superficially scooped out of the liver. Inspection of the contents will reveal pus, cells, and broken-down red and white corpuscles in the centre, whilst around the walls will be found living white corpuscles and a few hepatic cells. At a later date the amœba coli appears.

Signs and Symptoms.—In addition to the ordinary symptoms attendant upon febrile disturbance, there is the local sign of effusion in the right subdiaphragmatic or, as I prefer to call it, suprahepatic region. Pain in the early stages is caused by the mobility of the inflamed parts; the patient has not yet learned to accommodate the chest movements so as to ameliorate the pain; but soon these movements are adapted by the breathing becoming costal, so that the attachments of the diaphragm are left at rest as much as

possible. The pain is of a dragging character, the dial of pain is to be found within the right acromioclavicular angle. When the upper surface of the diaphragm becomes involved in the inflammation, the pleural surface opposite the base of the right lung and the visceral layer covering the right lung base itself are inflamed, giving rise to sharp twinges of pain. This lasts but a short time, however, and may be merely transient, owing to the speedy adhesions that form between the pleural surfaces. When pus has actually formed, there is frequently no pain complained of, and the patient may divert attention from his liver by some pulmonary, gastric, intestinal, or feverish ailment, which, whilst dependent upon the formation of pus, serves to obscure its presence.

The Local Symptoms.—Percussion and palpation of the liver, made in the usual way, may elicit neither tenderness nor enlargement. If, however, one hand is placed behind over the right lower ribs and the right loin, whilst the other hand is laid on the anterior wall of the abdomen just below the right costal arch, and the liver is grasped firmly at the same time and moved to and fro, a sharp, shooting pain is immediately felt in the right shoulder at the acromioclavicular angle. The pain thus elicited is of so intense a character that the patient dreads any attempt at a repetition of the examination and prays to be spared the agony. Whilst percussion of the lower limit of the liver affords well-nigh negative evidence, it is different on the upper aspect. Percussion above the right hepatopulmonary line reveals an increase in dulness upward. The dull area, moreover, is characteristic in shape and fairly constant in position. In the neighborhood of the right nipple, whilst percussing from the sternum outward, the area of dulness is found to rise suddenly and drop behind as suddenly, mapping out a rather conical-shaped patch, with its base below at the liver and its apex above usually a little within the nipple-line. The cone may be fairly sharp, or it may be blunted; the dull patch may, in fact, present an outline like an inverted saucer, an egg, or even a bowl on the top of the ordinary line of hepatic dulness. The intercostal spaces over the dull area may appear full, and percussion of these spaces may or may not be attended by pain.

It frequently happens that the lower lobe of the right lung becomes congested. The area of congestion is what might be termed fleeting; for whilst one day the "liver" dulness, the dulness caused

by the area of the pus, and the pulmonary dulness, due to congestion, are indistinguishable, on the next day the lung may have cleared up, leaving the cone of dulness distinctly mapped out. These lung lesions vary from day to day, and I have frequently been deluded into the hope that I was wrong in my diagnosis, and that the disease present was, after all, but a right pulmonary congestion and not a serious hepatic trouble. These fleeting lung congestions and clearings are apt to deceive the beginner and to cause him, as it has caused me, to delay operation until it is too late.

It is unnecessary to go over the other well-known clinical signs and symptoms,—the characteristic cough, the pain induced by lying on the left side, the alternating constipation and diarrhœa, the accompanying fever, the night-sweats, and many other signs and symptoms, which for the most part come and go. I must remark, however, upon the absence of pain and temperature. Neither pain nor increase in temperature is a necessary adjunct to the presence of pus in this region. When the initial attack of fever is over, there may be no more evidence, except by clinical examination, that there is any collection of pus in the neighborhood of the dome of the liver. I have notes of several patients with suprahepatic abscess who had neither pain nor *any* increase of temperature for fourteen days before operation, yet a couple of pints of purulent fluid were withdrawn from a conical area of dulness on the top of the liver in the neighborhood just below the right nipple.

Diagnosis.—When in warm climates a congestion at the base of the right lung suddenly develops, trouble in the hepatic region ought to be suspected. When that congestion is fleeting and recurrent, when the hepatic dulness along the upper border rises in a conical shape in the neighborhood of the right nipple, when the liver itself is but slightly or not at all painful or enlarged, but a sharp lightning pain shoots up to the right shoulder if the liver is grasped and moved to and fro, a suprahepatic inflammation may fairly be assumed to be present. The hollow needle of the aspirator is, however, the ultimate arbitrator in the question of diagnosis.

Prognosis.—By early treatment—that is, aspiration and subsequent tapping and drainage—the mortality from liver abscesses has been greatly reduced. Of twenty-eight cases of abscess on which I have operated by this method, four died and twenty-four recovered completely. Of the four fatal cases two were the first that I oper-

ated on, and the unfortunate result may perhaps be attributable to inexperience; a third was not under my care after the operation; and the fourth was treated not with the idea of cure, the disease being too far advanced, but merely for the purpose of relief.

Some practitioners still advocate an expectant treatment, in the hope that the liver pus may be coughed up. Cases of the kind occasionally recover after a long period of relapses, fever, and purulent expectoration; but to stand by and allow pus to run riot in the hope that it may finally burst into a bronchus and be expelled is a risky line of treatment. I would go so far as to say that any practitioner who allows an hepatic abscess to burst upward through the lung, instead of drawing off the pus, has not done his duty by his patient.

Treatment.—When pus is suspected in the liver or its neighborhood, it is the duty of the medical practitioner to ascertain *at once,* by means of the hollow needle of an aspirator or an aspirating syringe, whether pus is present or not. There need be no hesitation in performing this simple operation. Pricking the capsule of any inflamed organ is calculated to do good, and by puncturing the liver capsule, in say half a dozen places, in every instance in which I have employed it, good results have followed. What is the danger? One only,—namely, hemorrhage,—and cases have been recorded in which severe and even fatal bleeding has occurred owing to the liver being punctured by the needle of an aspirator. This calamity became the object of the writer's careful investigation, and his conclusions were presented to the British Medical Association in August, 1900, at the Section of Tropical Diseases. The vessels, which it is dangerous, on account of hemorrhage, to touch are the inferior vena cava and the portal vein *before* it enters the liver. The avoidance of the latter vessels is easy enough; but the question comes to be, "How deep may a trocar and cannula or the needle of an aspirator be introduced into the liver without danger of wounding the inferior vena cava?" In the *British Medical Journal* for September 1, 1900, this subject is reported as follows:

"*The Depth to which it is safe to Puncture the Liver.*—Mr. Cantlie demonstrated the position of the inferior vena cava in reference to its distance from the surface of the body. He stated that by a study of frozen sections it is possible to ascertain how deep the needle of the aspirator of the trocar and cannula can be carried into

the liver without causing untoward consequences from hemorrhage. He finds in a body with a circumference over the hepatic area of thirty-two inches that the centre of the inferior vena cava is from four and a quarter to five inches off the surface, in a line drawn horizontally from the neighborhood of the xiphisternal articulation to the angles of the ribs behind. Before commencing an exploratory puncture of the liver, therefore, Mr. Cantlie recommends that the circumference of the body be taken, and, starting with the above measurement as a basis, a fairly accurate idea of how deep the puncture may be carried is ascertainable. In a body measuring thirty-two inches in circumference, it is not safe to penetrate deeper than three and three-quarters inches in a horizontal direction from anywhere in the line mentioned. For every inch of circumferential measurement above or below the thirty-two inches, a quarter of an inch may be added to or subtracted from the depth it is safe to penetrate. Abstraction of blood in inflammatory hepatic derangements Mr. Cantlie regards as most salutary. When the needle enters a large vessel in the liver substance, as judged by the free flow of blood in the bottle, he allows the needle to remain until six to ten ounces of blood are withdrawn. No ill effects follow tapping a vein in this position; it is only when the inferior vena cava, or the trunk of the portal vein before it breaks up in the liver, is wounded that dangerous hemorrhage is likely to follow. Every puncture of the liver by a needle causes a slight or even considerable flow of blood subsequently into the peritoneal cavity, as he had been able to prove clinically; but in all probability it is this very flow of blood which contributes to the marked benefit usually following liver puncture. The dangers of hepatic hemorrhage are confined to puncturing the inferior vena cava, the extrahepatic portion of the portal vein, or penetrating a mass of malignant tissue occupying the liver."

Having ascertained the presence of pus, what is the next step? There are two courses open, one is to reach the pus by a "cutting" operation, another by "trocar and cannula." I have thrown in my advocacy with the latter method, and as my experience increases the more convinced am I that for *deep-seated* abscesses of either the suprahepatic or intrahepatic variety it is by far the better. It will be noted that the arguments which I subsequently advance are in connection with *deep-seated liver abscesses,* not abscesses which actually bulge either towards the abdominal wall or at the ribs, so

that the pus is close to the surface. The abscesses have in these instances been left so long that the pus has burrowed its way to the surface, and the so-called "operation for liver abscess" is merely setting free subcutaneous pus. Therefore I debar all the treatment of such advanced abscesses being considered as "operations for liver abscess." Nature has in this instance saved life,—not the surgeon, who has done his best to sacrifice it, for the abscess should never have been allowed to advance so far. With abscesses allowed to attain such unjustifiable proportions it matters not which operation is undertaken, and cutting is perhaps the better. With such subcutaneous collections of pus I am not dealing, but with deep-seated pus which does not bulge either towards the anterior abdominal wall or towards the right lower intercostal spaces.

The chief argument against the employment of the trocar and cannula is that it is "unsurgical," whatever that may mean; and the advocates of this use of the knife declare that any other method is "timid" surgery, that they like to have "a good view of what they are doing," and that they like "to look their enemy in the face." These are not scientific arguments, but mere statements, and flavor of surgical braggadocio. My chief objections to "cutting" operations are—

1. The severity of the operation is calculated to cause a practitioner, especially if he is single-handed, as often happens in tropical countries, to defer it until too late in the disease. To cut down by way of the chest, the pleura, the diaphragm, and the peritoneum to reach a (suspected) abscess of the liver is a line of treatment that the patient, if he knows anything of the operation contemplated, is apt to shrink from; and even the medical practitioner prefers to try every available resource before condemning his patient to so severe an ordeal. This hesitancy to perform a laparotomy or a transthoracic operation may cost the patient his life, and is one of the chief causes of the high mortality attending upon liver-abscess operations. Again, hepatic abscesses occur for the most part in tropical countries, where skilled help may not be available, where trained nurses are unknown, where the appliance for surgical procedures of the "cutting" kind may be but few, and where, therefore, "heroic" operations do not commend themselves and can be undertaken only at great risk to the patient.

2. "Cutting" operations, either by transthoracic or by lapa-

rotomy methods, are "over-heroic." There is no necessity for submitting the patient to so severe an ordeal. Neither practice nor results justify these heroic measures, and I have no hesitation in declaring against them. The men whose opinion I most value in this connection, as well as my own experience, declare in favor of the milder method; and, even though I may be accused of surgical cowardice, I still believe that I am doing the best for the patient.

Operation by Trocar and Cannula and Subsequent Siphon Drainage.—When a liver abscess is suspected, pus ought to be sought for without delay. This is done by introducing the hollow needle (not longer than four and a half inches) of an aspirating syringe or of an aspirator into the liver. If pus be not found at once, the needle may be inserted again and again—say, six or more times—into the liver in different parts.

In my opinion, the pus ought never to be sought for unless the surgeon is prepared to operate at once should pus be found. In many hospitals and in the private practice of many physicians, it is customary first to search for pus and, should it be found, to ask a surgeon to operate at a later date. This is a dangerous and unjustifiable procedure. If the physician wishes a surgeon to operate, the latter should be at hand ready to do so the moment pus is discovered; for, were a thin-walled abscess near the liver surface to be pricked in one or more places by a needle, the pus might quickly escape thence into the peritoneal cavity. Even after pus is found it is well to introduce the needle in one or two other places in the vicinity, in order to ascertain the "lie" of the abscess, so that it may be drained from the lowest part. Never introduce the same needle by which pus has been found into another part of the liver, or, at any rate, do not reintroduce the needle until it has been cleaned; the reason is obvious.

When the abscess has been found, incise the skin at the seat of the needle puncture for about three-quarters of an inch, to admit the trocar. The trocar and cannula to be used should be not less than one-third of an inch in diameter and have a stem four and a half inches in length. Plunge the trocar and cannula into the abscess, maintaining the direction travelled previously by the hollow needle. Withdraw the trocar and stop the flow of pus through the cannula by placing the thumb over its mouth, as it is unwise at this stage to allow the abscess cavity to empty itself completely.

Through the cannula introduce an india-rubber tube half an inch in diameter and nine inches long; this may be done by stretching the tube upon a metal rod with a small end hook at one side in which the rubber tube is caught so that it can be stretched. The tube has, of course, several holes cut in it at the end intended to be pushed into the abscess. When the tube and the rod in which it is stretched touch the bottom of the abscess cavity, withdraw the cannula over the stretched tube; then allow the tube to contract towards the bottom of the abscess and remove the metal rod. The drainage-tube is now in the abscess and some four or more inches project from the side of the patient's chest. The tube may be cut short, but I prefer to leave it long and to establish siphon drainage by inserting into its projecting part one end of a piece of glass tubing of suitable size and three or four inches long, the other end of which fits tightly into a rubber tube of sufficient length to reach the bottom of a bucket standing by the side of the bed. The bucket should contain enough carbolized water to cover the outlet of the tube, and into this the pus drains. A weight ought to be attached to the lower end of the tube, to prevent slipping or displacement. The operation is completed by stitching the tube to the skin where it issues from the chest, and covering the wound around it with wet antiseptic gauze.

The subsequent treatment consists in keeping up the drainage until the fluid that issues, as seen through the glass tube, is no longer purulent or flocculent, but merely bile-stained. If at any time pain in the shoulder or side is complained of, raise the bucket off the floor until it is nearly on a level with the bed; this lessens the severity of the siphonage, which probably caused the "dragging" pain. As pus disappears stop drainage and shorten the tube, reducing its size as the discharge gradually ceases.

Pædiatrics

DEFORMITIES IN CHILDREN, FROM THE STANDPOINT OF THE GENERAL PRACTITIONER.

ILLUSTRATED WITH BLACK-BOARD SKETCHES BY THE AUTHOR.

BY JOHN MADISON TAYLOR, M.D.,

Late Professor of the Diseases of Children in the Philadelphia Polyclinic; Assistant Physician to the Children's and Orthopædic Hospitals; Pædiatric Physician to the Philadelphia Hospital, etc.

It is worth while for the medical practitioner to review from time to time the significance of those minor deformities which are often revealed by careful observation of children. In the hurry of routine work we are likely to omit that complete search which is an essential condition of thoroughness. We acquire the habit of forming a rapid judgment, which meets most of our requirements, but is insufficient if the disorder under examination is complex or obscure. Fortunately, to search thoroughly the surface of a child's body is an easy task as compared with the same quest in an adult, not only because the superficial area is less, but also because in grown people the disinclination to undress, the character of the garments, indolence, and many other things interfere with our best intentions. It is probably a mortifying experience with most of us to learn that we have failed to note some clinical point which has later been found by some one else and remedied. The remark is credited to the immortal Jenner that "More mistakes are made by not seeing than by not knowing." I admit that even in a clinical lecture I have sometimes dwelt overmuch upon certain obvious features and left the more important one to be discovered afterwards by my assistants.

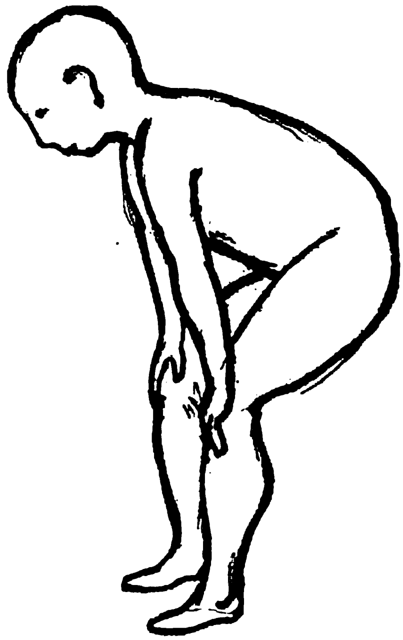
It is undoubtedly of great value to acquire the faculty of forming quickly a comprehensive opinion on the condition of a child from many small collateral as well as obvious features. When this is done, however, it savors of omniscience, which none of us have a

right to claim. It is a safer rule never to allow oneself to be satisfied with casual judgments, however suggestive or satisfying they may seem, unless duly fortified by a critical search over at least the usual clinical landmarks. Perhaps one of the most unfortunate effects

Fig. 1.

Pseudohypertrophic muscular paralysis. First position in the act of rising.

Fig. 2.

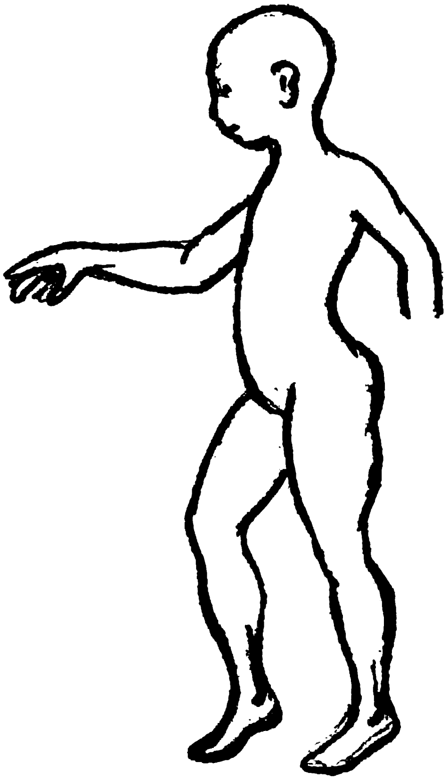


Pseudohypertrophic muscular paralysis. "Step-ladder" position.

of modern ultra-specialism is the confiding faith which induces both the physician and the patient to wait until some conspicuous deformity is revealed, which shall then be hurried to the orthopædist for correction. It would seem a wiser course for the medical man to avail himself of his many opportunities for a thorough search over the bodies of those in his keeping, and to correct any deformities in their incipience. Perhaps one reason why this course is less commonly pursued is the impression which seems to obtain that deformities can be adequately combated only by the specialist. Indeed, it is a matter of remark in our post-graduate schools that the department for the correction of deformities is not appreciated by the average student, but only by one whose attention is especially directed thereto. Yet a few hours there spent would afford in-

valuable training in the diagnosis of thoracic deformities, always of the utmost significance in the study of the disorders of the great organs in the chest, as is also the examination of the abdomen to learn of the graver disturbances of the contained viscera. Displacement of the kidney, cases of pseudohypertrophy, muscular paralysis (Figs. 1, 2, and 3), etc., may thus be found.

FIG. 3.



Erect position for walking, illustrating pseudohypertrophic muscular paralysis.

Many conditions which are regarded as belonging properly to the province of the surgeon come first under the eye of the general practitioner, who may or may not possess sufficient skill or special judgment to deal with them fully; yet they certainly demand recognition and early care to prevent their increase. They should also receive suitable constitutional treatment at his hands, both before and after being referred to the surgeon or orthopædist. Again, they should be so closely observed that the surgeon shall

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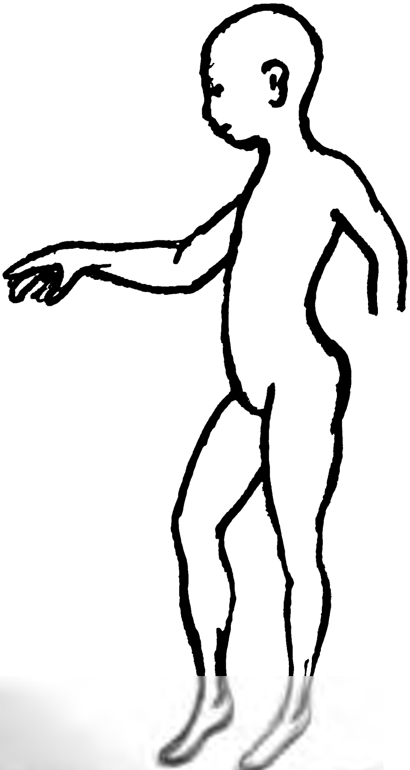

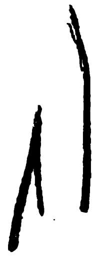

empyema.

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Frequently, hernias are not suspected or discovered unless the ring is explored and found weak or patulous. The abdominal variety is oftener seen, but escapes attention through ignorance and is too frequently wrongly regarded as of little importance. Tendencies to malformation of the head in infants may lead later to serious mental conditions which before the closure of the fontanelles are often remediable. Deformities of the legs and ankles, talipes, flat-foot, etc., are in many cases best corrected by the attending physician before the period of walking. He is the one to recognize and initiate the treatment of these and many other minor departures from the normal, and should know when to call in the specialist, noting carefully the phenomena associated with faults of shape or attitude, so that the specialist may judge fairly and form a reliable prognosis.

In children many deformities arise, which may become permanent and disabling or disappear entirely. Among the causes it is not necessary in all cases to assume an antecedent disease, such as rickets. Changes in the manner of life, with opportunities for good hygiene, out-door activities or enforced housing, leisure or labor, faulty attitudes due to negligence or indolence or fatiguing occupation—all exert great influence for good or evil. The worst instances of rhachitic deformity are seen in the cities, where the activities are less spontaneous and natural and the artificial restraints and deprivations are too continuous and severe. The fundamental cause of rhachitis is faulty cellular metabolism, which may arise from excessive and improper food of good quality as well as from deficiencies. Once the tendency to deformity is established, it proceeds rapidly, and is encouraged by the confinements of school life, such as standing and sitting for protracted periods without the relief of natural healthy movements.

VISCERAL CHANGES.

Sickly, pale children with clubbed fingers may be victims of chronic bone disease, of bronchiectasis, or congenital heart trouble; but in the great majority of instances there is present an empyema, and hence the necessity of critically examining the lungs in all children of this class.

Where the heart is found to be displaced to the right, which is by no means uncommon, it is necessary to ascertain whether this be a congenital peculiarity or an acquired dextrocardia. The cause must be searched for, and, if possible, removed, for a heart forced out of its normal position cannot do its work well, being rotated on its own axis and presenting unnatural contact relationships with the other organs. (Figs. 4, 5, and 6.)

FIG. 4.

Rhachitic thorax, "funnel-breast" displacement of the heart, lungs, etc.

FIG. 5.

"Dextrocardia," from empyema.

FIG. 6.

Spinal curvature due to empyema.

A special form of dwarf was described several years ago by Roland G. Curtin in this country and recently by A. Gilbert and F. Rathery in Paris,[1] who announce it as an original observation of a special type of nanism. The characteristic clinical feature is a mitral stenosis of more or less definiteness, but without functional symptoms or marked dystrophies. This is a most important generalization and sheds much light on a puzzling class of mental and physical defectives. There may be evident little more than stunted growth in varying degree and vague physical or mental shortcomings; or, again, a decided dwarfishness, accompanied by

[1] Presse Médicale, May, 1900.

a specific facies, round shoulders, a wrinkled, furrowed face, seemingly prematurely old. Or the patients may be of infantile type of body and disposition, seemingly perennially young. Some are of slow intelligence and quiet in manner; others are loquacious, of rapid, tripping speech, of loose phraseology, stammering or lisping, with markedly subnormal intelligence and erratic, inconsequential ideation or pronouncedly original in thought and speech. The one common trait is timidity. There are usually marks of degeneracy more or less conspicuous, and the organs are of defective functionation or structural unsoundness. Unfortunately, this is seldom marked in the genital sphere, and from this arises much trouble. The curious feature shared by these defectives is the uniform vigor of their cardiac tissues, resisting other disease, the mitral lesion remaining latent, even during attacks of articular rheumatism and in pregnancy.

Many of the less pronounced congenital cardiac defects escape observation, and the subjects reach early adolescence, always the victims of functional derangements accountable on no other ground. Of the acquired valvular troubles arising in early life the literature of medicine is full.

Fibroid phthisis, resulting in retraction of the lung, may change the position of the normal apex-beat; pneumothorax is a common cause of this condition. One must then search for evidences of collapse or pressure. Effusion into the pleural cavity by pneumothorax, or pleural effusions of either side, inflammatory, serous, or bloody, demand recognition and treatment. Emphysema, especially if with hypertrophic features, or other causes of enlargement of the lung, may induce displacement of the heart; also intrathoracic tumors, extensive pneumonic consolidations, or abundant pericardial effusions of any kind. Certain disturbances of the abdominal contents produce similar results, such as enlargement of the liver or other solid organs, gaseous distention, abdominal tumors, or ascites.

EFFECTS OF DISEASE OF THE NERVES.

Most of the deformities in children are the products, directly or indirectly, of disorders in the nervous system. Even the hereditary forms, such as talipes, are believed to be often due to congenital poliomyelitis. When disease in the mother is the cause, the

form assumed is most often determined by neurotic factors. Rhachitis is a disease of nutrition primarily, but has associated with it early or late so many neurotic phenomena and sequelæ that it may almost be called a neurosis. Hence a careful study of neuropathology, along with the physiology of development, is essential to an understanding of bodily asymmetries.

Hysteria, which occurs oftentimes in adult males as well as in females, and also in very young children (though certainly less commonly), affords the key to many varieties of deformity. Some of them become so fixed by contractures that they are as permanent and troublesome as those due to cerebral palsy or poliomyelitis, and may demand cutting operations and fixations. The milder forms of talipes, wrist-drop, lateral and even rotary spinal curvatures, paralyses, and contractures are often due solely to hysteria, and are remediable by suggestion, domination, isolation, and other rational measures.

INCIPIENT TUBERCULOSIS.

While it is not possible distinctly to predict the oncoming of tuberculosis, it is possible to recognize certain peculiarities of construction in children which, along with the family history, should give the physician some pretty definite suspicion. In the Congress for the Study of Tuberculosis which met in Berlin in March, 1900, this matter was discussed, and, among others, Professor di Giovanni called attention to certain morphologic factors, the result of considerable study and observation.

During the period between the beginning of the second dentition and puberty children often present certain features which are suggestive of tuberculous beginnings. These have to do with the skeleton, the circulatory apparatus, and the nervous system. Rhachitic phenomena also may be exhibited or these may be absent. The bones are long and thin, with irregularities of ossification here and there; the reach of the outstretched arms exceeds the body height; the thorax is distinctly too small for the needs of the organism, resulting in lack of proper development of the lungs, unless assisted by respiratory exercises. The heart will be found small and asymmetric, the arterial system insufficient, and the veins excessively prominent, resulting in a slowness of the circulatory activities. Material improvement may result if the child is enabled to enjoy satisfactory opportunities for oxygenation, especially by

open-air life and freedom from laborious occupation, and is not confined too much in school. The fault in these cases depends chiefly upon the state of innervation, which here requires unusually long periods of developmental training. Harrington calls attention to widely dilated pupils, not paralyzed, as an early sign of pulmonary tuberculosis. The condition of the skin is significant,—the presence or absence of pityriasis versicolor and chloasma and enlarged cervical glands or scars resulting from previous suppuration or surgical interference. In those predisposed to tuberculosis the thorax is usually long, with marked immobility or retardation of the upper lobes, and retraction, perhaps associated with a flat chest, short in its antero-posterior diameters, wide and deep intercostal spaces, stooping shoulders, wing-like scapulæ, and a convex vertebral column.

CONGENITAL MALFORMATIONS.

The congenital dislocations are so commonly those of the hip-joint that it is needless to consider others in this review. The deformity is not common, but it may be met with by any practitioner and should be recognized and treated before the child walks. Often no treatment is needed, and rarely is it of much avail if instituted late in life. (Figs. 7, 8, and 9.)

It is probably caused by some change in the central nervous system of the fœtus, which produces a disturbance in the development of the tissues about the joint. The acetabulum is too shallow to hold the head of the femur, which slips in and out when walking.

The form is usually bilateral, but may be unilateral. There should be no difficulty in diagnosis, certainly not if the condition has once been seen. The patient presents the appearance of a "sway-backed" horse. The lumbar curve is greatly exaggerated; usually the arms are moved about excessively, to aid in the balance while walking, and the gait is a peculiar rolling or rocking movement. The heads of the femora being placed posteriorly to the normal position of the acetabula, the body is inclined backward to maintain erectness. The head of the femur slides on the surface of the pelvis; hence the sway of the body is much increased. To meet this excessive latitude of motion, the heels are usually not brought to the ground in walking, and oftentimes the ligaments of the knees share in the weakness that results from a strained attitude.

Surgeons assert that cases treated between the ages of four and ten years can be cured or relieved by one means or another. Two methods are most in vogue: one is the bloodless reduction of Lorenz, in which the adductor muscles are torn by forcible adduc-

FIG. 8.

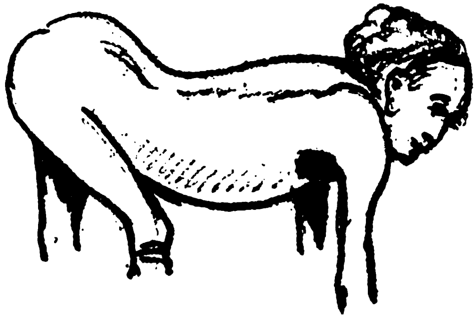


FIG. 7.

FIG. 9.

Drawings of various positions of a severe case of congenital dislocation of both hips.

tion, the thigh being flexed and extension and fixation being made in a vertical direction; the other is the bloody reduction of Hoffa, in which the acetabulum is scooped out with the Volkmann spoon. After either of these methods fixation must be maintained for a long time in order to obtain a cure.

GENITAL MALFORMATIONS.

Malformations of the genital organs should be carefully differentiated as early as possible for many cogent reasons. The idea of sex plays a highly important part in the evolution of mind and character, and if there be any peculiarity of the sexual organs it is far more influential in producing morbid self-consciousness than deformities upon the more conspicuous portions of the body.

Many of the difficulties may be readily removed or repaired. These deformities are ill-developed or absent penis, urethra, or scrotum; adherent or contracted prepuce; phimosis or paraphimosis; hypospadia or epispadia; congenital urethral fistula; and short frænum, contracted corpus spongiosum, or incurved penis. Exstrophy of the bladder may occur in the male or the female, and requires plastic operations, sometimes several in rotation, to accomplish good results. Hermaphrodism, or double or uncertain sexuality, is a grave source of moral mischief, and often can be discovered early only by the custom of routine examinations of young children by their medical advisers. If these conditions escape detection when the child is young, it is only by accident that they come under observation in later years. Indeed, it cannot be too strongly urged that the physician should carefully explore the whole surface of every young child under his care, that these conditions may become known and relieved as soon and as far as possible. He ought never to omit examining the penis of a male child, and should himself retract the foreskin to see that it is healthy. He ought to teach the mother to do this regularly, so that the common discomforts produced by constrictions and the accumulations of smegma may be relieved at once. It is rarely necessary to circumcise; careful stretching, by means of a pair of dressing-forceps, every second or third day, carefully avoiding pain and laceration, along with the breaking up of adhesions by a blunt probe and anointing the corona, is nearly always sufficient.

A very large experience in dispensary work, not only among children in the medical but also in special neurological clinics, leads me to the conclusion that it is extremely seldom that removal of the foreskin is demanded. No real good can be claimed for circumcision above that which can be obtained by judicious stripping. To be sure, many cases of so-called reflex disturbance result from

adherent prepuce; but the importance of this condition is greatly exaggerated by some surgeons and general practitioners, while wise neurologists credit the condition with less influence. If the child is of inherently unstable nervous equilibrium, through bad heredity or faulty environment, or both, small degrees of peripheral irritation are capable of inducing convulsions and other motor phenomena. Brilliant cures alleged to have resulted from circumcision need to be sifted in the light of other factors and the progress of time and development. The rhinologist often affords immense relief by the removal of pharyngeal adenoids, and the general surgeon often quotes this experience to sustain his too sweeping demands for circumcision; but the conditions are not analogous. The obstruction to the ingress of respired air in a child is of vastly greater influence for harm than preputial adhesion possibly can be.

PECULIARITIES OF THE RECTUM.

The condition of the infant's rectum receives much less attention than it deserves. Improving upon the time-honored soap suppository, which acts admirably as a mechanical stimulus to defecation, I have found that it is simpler and more effective to teach the mother to introduce daily her little finger, well oiled, gently but firmly far up into the rectum, and hold it there a short time; this almost at onces induces the expulsion of fæces. After a few days, as a rule, the procedure may be omitted, but sometimes it can be repeated to advantage, and finally it is no longer required. This method was begun on finding instances of greater or less narrowness of the anal opening, occasionally strictures, which were thus entirely cured. Lack of expulsive power is common, and for this the procedure has proved most satisfactory. The recent researches of T. C. Martin, of Cleveland, throw much light on the difficulties of defecation. He shows that anatomical peculiarities of the rectum, the sigmoid flexure, and the pelvic outlet are so numerous as often to warrant the term deformity. The infant's gut is deficient in muscle, hence in peristaltic power. The relatively greater length of the descending colon and sigmoid flexure and its mesentery (which, from its parietal attachment to its invagination of the lower loop of the sigmoid, is often greater than the distance from the promontory of the sacrum to the distal bone of the coccyx), and the deficiencies of the peritoneal invest-

ment of the tissues, contribute to a double or treble angulation of the gut and a resistance to the descent of the fæces. The presence of a typical anatomic valve which Martin demonstrates makes also for fecal obstruction. The bony outlet in the infant is so contracted and anal expansion consequently is so limited as almost to prevent the passage of solid fæces. The distensibility of the anus is only about one-fifth of that of the sigmoid flexure and the rectal chambers. All this increases the liability to that common trouble in infants, complete rectal prolapse, involving, as it does, all the coats of the gut. Inguinal hernia also often results from similar conditions. Along with the great length of the infantile mesentery must be remembered the absence of the more completely developed adult pelvic organs and other contiguous structures which together aid in the rectal support. The difficulties mentioned are often escaped by the infant who is encouraged in normal activities, chiefly by reason of the developmental progress. Tendencies to prolapse, if present, should be promptly recognized, and may be alleviated by careful diet, hygroscopic suppositories, and fluid injections to favor softness of the intestinal contents and their ready descent through the convoluted gut, the valvulated rectum, and the contracted anus. Hence massage is of great efficacy to develop the auxiliary abdominal muscles and the expulsive muscles of the intestinal wall, and directly to expel the contents along the tortuous bowel and reduce the obstruction of the valve. Where there is overgrowth of the rectal valve, it may be obviated by gradual dilatation with the finger as described above. Rhachitic subjects with markedly contracted pelvic outlets need forcible divulsion. To overcome the tendency to rectal prolapse posture is most important. The prolapse is favored by the natural attitude of defecation, which is flexion of the hips. When horizontal extension is maintained during defecation, the danger is less and a cure often follows. To reduce prolapse it is best to assume the knee-breast posture, to be followed immediately by the attitude of horizontal extension to maintain the rectum in position.

KNOCK-KNEE AND BOW-LEGS.

In speaking of the causation of knock-knee and bow-legs, H. L. Burrell points out that in certain children of two or three years of age, with prominent abdomens, there is frequently an anterior

bowing of the juncture of the lower and middle thirds of the femur and tibia; also that in older children when the abdomen begins to be prominent the weight of the body is finally thrown so far forward that the pelvis projects backward and this same leg deformity results. He quotes McAllister to the effect that the shape of the pelvis in infants is very different from that in adults. The angle in the infant is one hundred and thirty-seven degrees, in children one hundred and forty-five degrees, in male adults one hundred and fifty-three degrees, and in female adults one hundred and fifty-five degrees. This explains the fact that bow-legs in girls correct themselves more readily and surely than in boys. The centre of the body changes markedly as growth proceeds, the greatest change being between the ages of one and five years, the centre dropping one-half the distance from the umbilicus to the pelvis and forming an important factor in the causation of bow-legs and knock-knee.

It may be laid down as a working axiom that the highest anatomical efficiency is found with the nearest adherence to right lines, and that curves in the human body are to be discouraged as far as possible by inducing as much rectilinearity as is compatible with the normal structure of most parts, certainly in the backbone and the limbs.

It is essential for symmetrical growth that a right balance be maintained between the resistance of the bone and the strength of the muscle. The effect of ill-directed muscle action, especially flexor or adductor movements, tends to exaggerate morbid curves. If such a curve is once initiated, muscular action may readily aggravate and make it permanent; hence the danger of allowing children so affected to work or play in such a fashion that too great monotony of movement is maintained. Again, the muscles on the outer surface of the lower limbs in infants are not developed as well as those of the inner group. If the stronger adductors acquire the first invigoration, they readily overmaster the outer ones and lay the foundation for an outward curve. These faults are frequently due to hereditary tendency, and as soon as observed it is the duty of the medical adviser to use his judgment and authority to correct them. The means at his disposal are chiefly improved hygiene, leisurely outings, and regulated movements. Sometimes fixation is needed for the curved bones also.

HIP DISEASE.

Coxitis, or hip disease, one of the most common forms of tuberculosis of the joints, is a seriously disabling malady of childhood. It may begin in the bones or in the synovial membrane, is of slow and insidious progress, of varied symptomatology, and tends to destroy the articulation. It never develops in healthy children, but always in those whose tissues are vulnerable, especially to tubercular infection. An exciting cause in the nature of a trauma is usually regarded as giving origin to the malady, but, like that form of tubercular bone trouble called Pott's disease, it may arise without known injury. Coxitis deserves careful study at the hands of all medical men, for upon them often falls the duty of recognition and treatment.

The earliest, most constant, and often for a long period the only symptom is the characteristic lameness. This may be ill-defined, a mere favoring of the affected limb, or stiffness or awkwardness, noticeable at certain periods of each day, or only on certain days, with intervals of full activity, and the trouble may continue in this doubtful state for months. It is safe to suspect hip disease in any child in whom a persistent peculiarity of gait or stiffness or lameness is observed, and a thorough examination should be made at once.

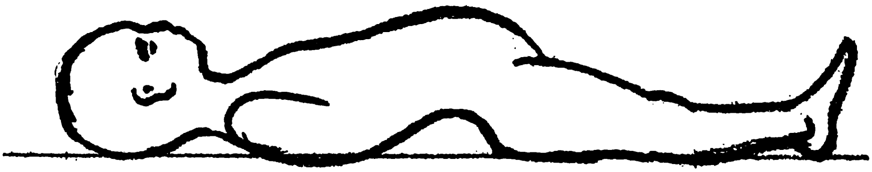
There may be little or no pain, at least till late in the disorder. When present, it is referred to the hip, the thigh, or often the knee; it may be in one small spot, as the inside of the knee or the central nerve distribution in the joint itself, or there may be diffuse pain over the surface of the thigh. It may or may not accompany the lameness, may come and go, or may suddenly develop as a terrifying affliction and defy ordinary means of relief. It is often worse at night, waking the sufferer from sleep. In the recumbent position one leg may appear smaller or shorter than the other and muscular atrophy may be demonstrated. A distinct lymphadenitis usually affects the inguinal glands of the diseased side. If both limbs are healthy, a child lying upon a hard surface can easily extend both legs, the back remaining flat; if on one side there is a beginning coxitis, the diseased thigh will remain flexed upon the pelvis, the leg upon the thigh while at ordinary rest. If the leg on the affected side be forced down flat to the table, the lumbar

curve will at once become highly arched and can be obliterated only by flexion of the leg and thigh. A lordosis will appear when

FIG. 10.

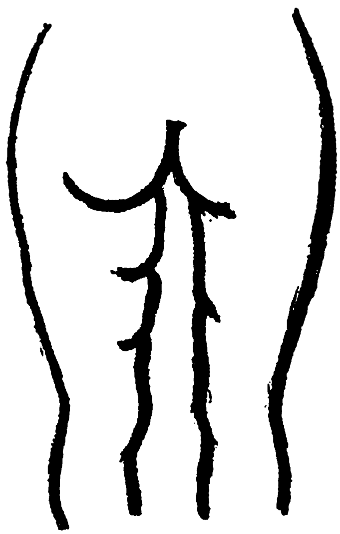
Differentiation of hip disease. Normal child.

FIG. 11.



Hip disease.

FIG. 12.



Hip disease, showing obliteration of the gluteal folds.

both legs are extended, if one or both sides are diseased. Pain can be elicited upon deep pressure in Scarpa's triangle just outside of the region where the beating of the femoral artery is felt. This is the seat of the pain complained of by the patient when the trochanter or the flexed knee is percussed. (Figs. 10, 11, and 12.)

Treatment must be begun at once, and consists mainly in continuous extension, fixation of the hip, and the wearing of suitable shoes.

SPINAL CURVATURES.

In children it is quite common to find curvatures of the spine, often so transient or slight as to escape notice unless a careful inspection of the back is made, as should be done in routine examinations. If these are neglected, they sometimes correct themselves

FIG. 13.

One way to produce lateral curvature.

spontaneously, or they may remain or grow much worse. Lateral curvatures, when sufficiently marked to be obvious at a glance, receive attention, but if not they may become fixed and sometimes permanent. The effort to maintain a vertical carriage by one who has a weak back early converts the single curve into three primary and compensatory curves, like the letter S. Anteroposterior deviations and rotations may be also exhibited. This condition depends in part on interference with function in the larger organs, and as these contributory causes disappear so does the curve.

Lateral curvatures of the spine arise from a variety of causes, but chiefly those producing weakness of the body from almost any condition. Among these the most potential are nutritional faults, convalescence from acute disease, and sometimes congenital misshaping of the bones or the facets of the vertebra. In these treatment must be early or little can be accomplished. As ordinarily observed they may be due merely to these simpler beginnings, or appear as the result of the milder forms of a tubercular process no longer active, only the deformity remaining. (Fig. 13.)

Barrow holds that the majority of cases of lateral curvature of the spine are caused by pelvic deviation, of which he points out four varieties. Permanent pelvic obliquity is usually the result of defective growth of one of the femoral epiphyses, generally the lower one. To prevent inequalities in the action of the limbs exerting influence upon the spine through the pelvis, the heel of one boot should be thickened until a normal pelvic level is reached. In addition to this the patient should sit upon a sloping seat for twenty minutes two or three times a day.

Habitual pelvic obliquity can be overcome by persistent watchfulness of the patient's habits, and by distinguishing the faulty attitudes assumed in the ordinary activities of life and sedulously correcting them.

Amesiality of the pelvis is more difficult of correction, because the neuromuscular sense of the patient becomes so perverted that finally the one-sidedness seems to him straight. In such cases it is imperative to place the patient before a looking-glass and hold a plumb-line to the episternal notch, thus demonstrating the obliquity. Then proceed to correct the position so that the xiphoid cartilage and umbilicus are plumb with the line. Exercises by movements of over-correction by extensions should be then employed systematically.

Version of the pelvis is usually the result of faulty sitting attitudes. For its cure sitting correctly is again to be employed for twenty minutes at a time, perhaps several times a day, getting both knees on the same plane, or with the knee of the affected side extended to the front of its fellow, the chest meanwhile being maintained in a straight position. Here also wall exercises are important; a pad being placed behind the ilium of the protuberant side, the physician makes pressure, along with a series of exercises

in correct standing attitudes. Other exercises should be taken lying down, especially upon the affected side, and using movements which tend to overcome the deviation. Extensor movements accurately performed are always the most useful. (Figs. 14, 15, and 16.)

Fig. 14.

Fig. 15.

Fig. 16.

Lateral curvature, common forms.

Often among the common forms of postural deformity are a number of fixed curvatures closely analogous to the recovered forms of Pott's disease, which cannot readily be differentiated except by an expert. When these arise, from whatsoever cause, they begin insidiously, and there will be found changes elsewhere in the bony skeleton, and particularly in the ligaments, requiring recognition and treatment. The changes in scoliosis include alterations in bones, ligaments, and intercartilaginous and muscular structures. The vertebræ may assume a wedge shape and exhibit atrophies on the concave side, and in some cases the adjacent vertebræ become ossified (osteitis). Pressure upon one of the roots of the vertebral arch may cause an ovoid form in the canal, and the bony fibres of the body of the disks acquire an oblique instead of an upright position. Thus the elasticity of the column is lost and a tendency to rotation is acquired. Along with this change the muscles become

contracted or atrophied, because their osseous attachments are brought too close together on the concave side. The muscles on the convex side become relaxed, stretched, and degenerated, while the muscles of the concavity remain rigid. A certain number of these cases will be found to suffer also from flat-foot or other deformities of the feet and ankles, and the treatment of one condition should supplement that of the other.

The symptomatology of lateral curvature of the spine requires little or no description, but it is necessary to attain some skill in measuring the degree of the condition. The curvature may not be obvious upon a fairly critical observation of the back, and can be determined only by placing the child in certain routine attitudes and causing it to make a series of movements by which the curve shall be rendered more prominent. For instance, the child should be made to stand as erect as possible, heels together, toes turned out, the hands apposed so that the fingers shall be accurately adjusted; then these two hands, carefully coaptated, should be thrust far forward, elbows straight, and carried through a half-circle from the vertical above the head to the vertical below; next the same motion should be repeated in a half-bent attitude, while the observer stands in the rear and measures with the eye an outline of the spinous processes as they are thus brought into view or alignment. Again, in estimating rotation, the hands of the patient held in this same attitude should be clasped by another person in front and moved from side to side, rotating the body, while the physician again examines the back. Thus it may be seen that one or another of the movements of the spine will show a degree of rotation not otherwise to be seen, and a number of other movements needless to be described here will bring out latent deformities.

The most important agents for determining the degree of scoliosis are special apparatuses for measuring, which the average practitioner will not be likely to possess, but it is possible to get a very fair record by means of a strip of lead molded to the back, from which a tracing can be made on paper. This should be done as a matter of record in every case early, to enable the degrees of progress + or — (plus or minus) to be compared. This is necessary not only where the patient remains in the hands of the general practitioner, but is to be used later as comparative data by the consulting orthopædist.

In making a diagnosis it is necessary, of course, that the body should be free from all clothing down to or below the hip bones. The examination should be then made as suggested above, while the child is standing and also while suspended from a cross-bar. Any difference in the length of the lower extremities should be measured by placing under the foot of the shorter side a series of blocks or bits of shingle to bring the trochanters on a level. Sometimes the difference in the length of the limbs is real and sometimes only apparent.

In the treatment of lateral curvature one essential principle always obtains, and without the pursuit of this little or no success will come, no matter how highly gifted or instructed the physician may be,—viz.: intelligent supervision, which must be constantly maintained by the physician, along with a full recognition of the condition of the individual and his particular needs. It is a common experience for cases of scoliosis to be placed under the care of the ablest orthopædists and become practically cured, and yet in a very short time the deformity returns as bad as ever. This is due to two factors: one an insufficiently prolonged course of treatment, and the other carelessness on the part of the patient or parents. If now the family physician will take up the matter and himself supervise the continuance of the treatment, the very best and most permanent results can oftentimes be had far in advance of the possibilities open to the consultant, because it is rarely possible for him to retain the case under his direction long enough to satisfy all reasonable requirements.

Just here it may be well to say a word about the value of braces. No mechanical support can be of more than temporary or partial efficacy. In order that a brace may act efficiently, it must do so upon the principle of the lever, and three points are needed for the application of the force.

The chief deformity in lateral curvature is in nearly all cases higher than the inferior angles of the scapulæ, and few patients will tolerate a brace extending above the level of the shoulders; hence it is impossible in such cases to secure the three points at which to apply the force. Again, the constant application of a force pressing upon living structures produces atrophy and weakness of muscles and ligaments, and also limits and interferes with free thoracic movements; hence an important item in constitu-

tional vigor is interfered with, which is especially full freedom of thoracic movement. Again, it is natural for any one to rely or lean upon an artificial brace or crutch instead of cultivating an independent power or maintaining a rectitude of carriage. A properly fitting brace is needed in most cases for a varying length of time, and surgeons express diverse views as to the material of which these shall be made. The plaster cast is often the first and only one available, but for fixed braces a lighter material which can readily be removed or changed and readjusted is required. Of the material best for this, the claims of aluminum must be investigated. In many cases the patient can exercise satisfactorily only while wearing a brace. This is an important practical point to bear in mind.

The essential agency for the relief of curvature of the spine is a proper education of the patient to maintain the erect and easy carriage, the normal flexibility of the tissues, and proper coördinating power. These can be acquired only by a slow process of educational and developmental training which may require months or years to accomplish. In certain individuals, so eager are they to regain symmetry, that they will pursue any line of exercises outlined fairly well; but this faithfulness cannot be relied upon to any extent, and, again, it frequently happens that faults arise which cannot be foreseen and which must be promptly recognized and corrected. Let me again repeat that forceful regulated extensions are the most important means of overcoming contractures and acquired or latent deformities.

POTT'S DISEASE.

Pott's disease, or spondylitis, tuberculosis or caries of the spine, is a most serious disabling and often fatal disease whose virulence is in inverse proportion to its early recognition and quality of treatment. The medical practitioner should be not only familiar with the outline of the symptoms, but also alert to recognize the lesser phenomena which precede the spinal deformity, and which can be averted, leaving the one who would otherwise become a miserable invalid or misshapen creature fairly vigorous and symmetrical. Again, the proper treatment in the early stages is purely medical in so far that no interference of a surgical nature is indicated. This is to place the child at absolute fixation and rest for

from four to six months, and after that a supporting jacket or brace is to be used along with limited freedom of movement. All this can be determined and carried out to the utmost advantage by the physician without expert help, although it may be a wise course to call in a specialist to pronounce an opinion and to co-operate with him from time to time. But I cannot testify too strongly to the value of an early diagnosis and rational treatment which will save infinite suffering of both body and mind. (Figs. 17, 18, and 19.)

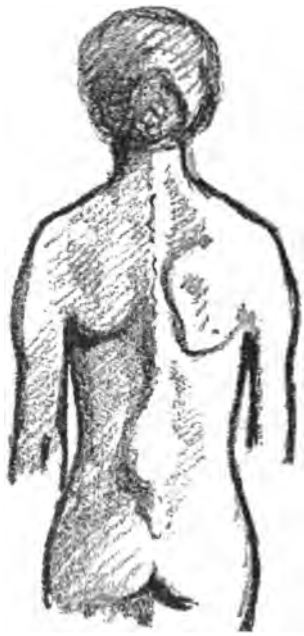
Fig. 17.

Slight lateral curvature from Pott's disease.

Fig. 18.

Dorsal caries, recovered form.

Fig. 19.



Lumbar caries, with lateral deviation.

If any cause other than tubercular infection underlies spondylitis it is in grave doubt. The old belief, long held, then long in doubt, of injuries to joints causing or predisposing to the local ravages of tuberculosis has been disproved by the experiments of Friederich,[1] who showed that there was no tendency for the germs which were travelling in the blood to lodge in tissues of joints which had suffered traumata. It would seem that inflammatory

[1] Deutsche Zeit. f. Chirurg., November, 1899.

processes due to trauma, and the consequent reparative processes then initiated, rather tend to protect them from the invasion. This view is strengthened by the results of Bier's method of treatment of tuberculous joints by producing a passive hyperæmia, and Noetzel shows that the favorable result is due to a concentration of the natural bactericidal forces by reason of the increased amount of blood brought to the part, and later to the development of connective tissue. (Figs. 20 and 21.)

FIG. 20.

FIG. 21.

Attitudes in Pott's disease.

The symptoms of Pott's disease begin most insidiously. There is a gradual loss of color, with disinclination to play or to eat. An early symptom is pain in the abdomen, vaguely localized or referred to one or another place in succession. At night the patient is restless and starts up from his sleep. In the dorsal form of spondylitis the pain is often referred to the chest rather than the abdomen. Upon examination the attitude and gait of the child are characteristic. The walk is slow, with rigid shoulders and inelastic movements; sometimes one or the other of the feet is affected. The child, if asked to pick up something from the floor, does not bend over as is natural, but crouches down, head held erect, so as not to bend the spine. The muscles of the back and lumbar regions are held rigidly in nature's effort to relieve the diseased spine from all motion. (Figs. 22, 23, and 24.) When the disease is in the upper dorsal region the shoulders are elevated and the head is sunk on the chest. When in the cervical region there is often a spasmodic contraction of the muscles of the neck resembling torticol-

lis. (Fig. 25.) When sitting the child is inclined to hold its head with its hands, or with the elbows on a table or the knees or other

Fig. 22.

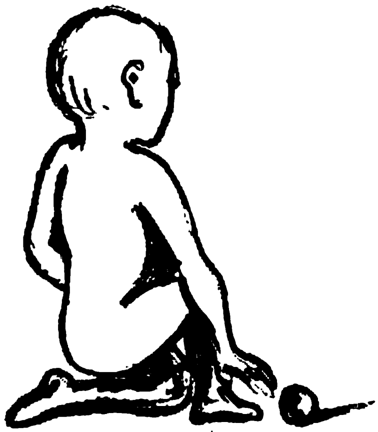


Fig. 23.

Fig. 24.

Fig. 25.

Various attitudes in Pott's disease.

support. This is also seen when the lesion is in the upper dorsal region. As the disease progresses the kyphosis can be seen, a back-

ward bending of the spinal column which forms a knuckle at the site of the disease. If in the lumbar region the bending is often forward, forming a lordosis. These deformities are brought about by the absorption of a portion of the bodies of the diseased vertebræ, lessening vertical resistance and inducing the characteristic curves. Still later abscesses may form along the psoas muscle in the iliac, lumbar, or retropharyngeal regions, according to the location of the disease. The iliac and psoas abscesses are chief evidences of disease in the lumbar or dorsal regions. The lumbar abscess is due to lumbar disease, and the retropharyngeal abscess is an evidence of change in the cervical vertebræ.

In the late stages of the disease paralysis may occur, usually of the legs, but sometimes of the lower half of the body. This paralysis is bilateral, and due to meningeal irritation and not to pressure. The degree of the paralysis is not in proportion to the kyphosis. Increased reflex action is the rule, and anæsthesias are often present. A bad symptom is rigidity of the muscles of the legs, evidencing destructive changes in the cord.

The recognition of Pott's disease is to be based upon evidences of pain as described, the rigidity of the spine, the hyperconscious gait, the contracted attitudes, the deformities, and sometimes upon the location of abscesses and paralyses. Upon the first four or five of these points a positive diagnosis can be made. Early or late deformity always appears to a varying degree, but long before this occurs the condition should be recognized and treated. Contracture of the psoas muscle is a valuable sign in differentiating the lumbar from the dorsal form. When a child complains of persistent abdominal pain without coated tongue or evidences of gastro-enteric disorder, and exhibits a rigidity of the spine, as shown by the stiff attitudes and cautious methods of progression, it should be carefully scrutinized for spinal deformities and rigidity. If the condition is recognized before the deformity appears, the child should be at once placed at absolute rest and kept there until other symptoms develop or all subside, and if this be done a large proportion of cases will recover without deformity and be saved from abscess formation and paralysis.

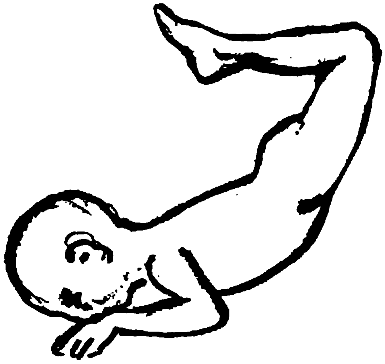
The test for the spinal rigidity is to lay the child face downward, grasp the two ankles with one hand, laying the other hand upon the spine for counter-pressure, and carry the legs upward

and backward until the soles of the feet point towards the head. If tubercular disease is present the spine will rise in a very nearly straight or rigid line; if normal it will assume a uniform flexible curve from the hips to the shoulders. (Figs. 26 and 27.)

Fig. 26.

Normal child.

Fig. 27.



Caries of the spine.

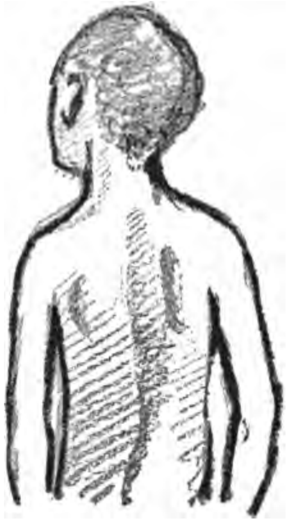
To test for psoas contraction, place the child in the same position, grasp the legs and flex them upon the thigh until the soles of the feet point upward, then gently hyperextend the thigh with the other hand placed upon the lumbar region. If there be contraction the "psoas spasm" will be felt,—a vibratile condition or spasmodic twitching of the muscles. A morbid flexion of the thigh is often present on one or both sides, due to contraction of the psoas muscle. This deformity can be recognized early and is distinctive. The kyphosis in Pott's disease is acute; that seen in rickets is longer, more of a curve, and can be overcome by manipulation. The pseudo-palsy of rickets is less pronounced and free from pain or tenderness.

In malignant disease of the spine there is usually persistent and severe pain, as well as early a more marked paralysis, and the patient is evidently much more seriously ill. The deep reflexes are greatly exaggerated in early Pott's disease, and ankle clonus is present. Torticollis may be confused with cervical Pott's disease, but in the latter the muscles of the back of the neck are most affected and the chin is elevated. In torticollis the sternomastoid muscle is contracted and the head turned away from the contracted side. Coxalgia is also sometimes confused with psoas contracture, but

FIG. 28.

Torticollis.

FIG. 29.



Torticollis.

FIG. 30.

Caries of lumbar spine.

FIG. 31.

Caries of dorsal spine.

FIG. 32.

Double Pott's disease, both dorsal and lumbar.

in hip disease the motion is restricted in all directions and the joint is tender, while in Pott's disease motion is limited only when in extension and there is no joint tenderness. (Figs. 28 and 29.)

If at any time there is a great increase of pain, abscess formation is to be feared, and can be recognized in one of the usual localities, depending upon the location of the disease. (Figs. 30, 31, and 32.)

The mechanical treatment of Pott's disease is divided, as has been said, into the prone and the ambulatory stages, and the objects are to immobilize the spine and to support the superincumbent weight of the body, so that the diseased vertebræ may enjoy absolute rest and relief from all weight and motion.

The resting period, or the "prone" treatment as it is called, is now greatly simplified by the use of an extremely clever device of E. H. Bradford, of Boston, known as the Bradford frame. This is made of light gas-pipe of a size to fit the child, giving three or four inches greater length than the height of the patient and one inch broader than his width at the shoulders. It is then covered by lacing two strips of canvas around it, extending from each end, leaving an uncovered interval of from four to eight inches in the centre under the buttocks. This frame is then placed on the bed and the patient strapped onto it by webbing, one strap across the hips and two at the shoulders. These are passed under the frame transversely, with one above and one below the shoulders, then diagonally across the body, and each fastened to the other. Similar bands are placed under the lumbar region and the neck to allow the spine to rest in its natural curves. The patient is unstrapped and sponged each day, rubbed with alcohol or anointed with some unguent, and liberally powdered. The patient should never be allowed to sit up, but is rolled from side to side during manipulation.

If the disease is in the upper dorsal or in the cervical region it may be necessary to apply extension also to the head. Upon this frame children should be taken out in the air every day, and there will always be seen rapid improvement in all the distressing symptoms, especially in the pain and the digestive phenomena, and it is remarkable how happy and contented the little patient is after the first week.

This rest should be maintained for from four to twelve months,

according to the requirements of the case. When the time comes to do away with the frame some form of support, jacket, or brace can be adopted to allow the patient the use of his limbs and at the same time give as full support as possible to the diseased spine. This ambulatory treatment may be continued for two years or more to allow firm ossification of the diseased vertebræ, and should be under the supervision of a skilled orthopædic surgeon.

Again, systematic extension movements are needed to overcome the lesser contractures and regain elasticity of tissues, normal poise, and freedom of action.

THE DEFORMITIES OF RICKETS.

The deformities caused by rickets are so familiar to all practitioners of medicine that it is needless to describe them at length, but some are of great importance, especially those of the thorax and limbs, and should be early recognized, not for such treatment as is possible for mechanical or æsthetic reasons, but to estimate them in connection with their effects upon the contained vital organs and the consequent constitutional depression.

It must be borne in mind that the state of impaired nutrition in rickets produces changes in almost all the tissues. When it is considered that at least seventy-five per cent. or more of all children living under conditions of poor hygiene exhibit some of the phenomena of rickets, and that a very large proportion, impossible to estimate, of the well-to-do classes also show evidences of the disease, it will be seen that in estimating deformities this factor stands pre-eminent.

Changes in the skull produced by rickets have little bearing upon the intelligence of the individual later in life, whereas changes in the cranium due to other causes may; hence this deformity, although an obvious one, has little clinical significance. It is quite true that during the period when the fontanelles are usually open and where there is craniotabes, the brain is thus rendered more vulnerable, and is hence subject to such disturbing influences as may come through a moderate degree of violence exerted directly or indirectly upon the exposed brain. Unless the skull acquires a very conspicuous change in its shape through the malleability of the bones, this factor is not likely to be important. In regard to the changes in the shape of the long bones, it should be the endeavor

of the physician to prevent these as much as possible, and it is not difficult to do so by placing the child at absolute rest, which is easily accomplished by using some means to fix the head so that sitting up is not permitted, and then the bony skeleton throughout will be prevented from assuming changes in shape during the time when constitutional treatment is being pursued. Again, where these twistings and curvings of the long bones have been produced it is readily possible to overcome them to a very great extent by making it impossible for the child to sit continuously in such attitudes as induce a bending of the bones or disturbances in the ligaments. (Figs. 33 and 34.)

Fig. 33.

Rhachitis, characteristic attitude, showing how the legs acquire special curves.

Fig. 34.

Rhachitic thorax, displacement of the heart, etc.

To go into the subject of relief for the deformities of the long bones would require too much space and is a familiar subject to all.

The thorax is subject to very important and sometimes serious alterations in its shape and capacity during the active process of the disease. The most common abnormality in the thorax is the beading found at the junction of the ribs with the costochondral cartilages. This "rosary" is sometimes the only symptom of rickets in an individual who may subsequently develop marked deformities in various directions, and it is well to bear in mind that it occurs in greater degree and with equal frequency on the inside of the chest wall. The pressure of the atmosphere is always greater than the resistance of the tissues from within, and hence when the ribs

are in a malleable state they readily acquire changes in shape induced by this pressure exerted upon the weakest portion of the arch. Also the pull of the muscles on the softened ribs results in diverse characteristic changes in their shape, and these vary in proportion to the quality of the muscular tone, the degree of activity of the child, and the age at which the softening is most marked.

In certain conditions not easy to explain a deformity arises known as "pigeon-breast;" in others, and this is especially true if there is any obstruction to the entrance of the inspired air, as by enlarged tonsils or adenoid growths, the opposite condition arises, and we have a deformity known as "funnel-breast." The former is the rule; the latter (the funnel-breast) is less common, yet it is sometimes of so pronounced a character that a moderate-sized apple may be almost buried over the end of the sternum, and it would seem that the distance between the bottom of the funnel and the backbone is only an inch or two. Both these malformations can be overcome to a very great extent, although sometimes they persist throughout life. The most conspicuous of the rhachitic deformities of the chest is a transverse furrow caused by the pull of that powerful muscle, the diaphragm, which is attached anteriorly along the lower part of the chest walls just posterior to the edges of the ribs.

There is also a distinct groove running from the outside of the nipple line on each side, extending obliquely just posterior to the beading of the ribs. This furrow encroaches upon the capacity of the thorax and interferes with the normal expansion of the lungs, especially on their anterior borders, on the left side markedly depressing the position of the heart. The breadth of the thorax, measured through the axillary line, is small above, but more normal below, and as the flat ribs are approached becomes abnormally broad by reason of the upward pressure of the abdominal viscera, which are unusually distended.

The abdomen of the rhachitic child is, as a rule, conspicuously distended by gas. The intestines and stomach are oftentimes dilated. The liver is pushed down and usually enlarged, and the relaxation of the external abdominal tissues along with the increased pressure from the gaseous distention of the intestines often results in hernia, especially the umbilical form. Other evidences of atony

are shown in the abdominal and intestinal muscles, and constipation or irritation in bowel actions is the rule.

FIG. 35.

Rhachitic lordosis, umbilical hernia.

FIG. 36.

Rhachitic kyphosis.

FIG. 37.

Rhachitic kyphosis, funnel-breast.

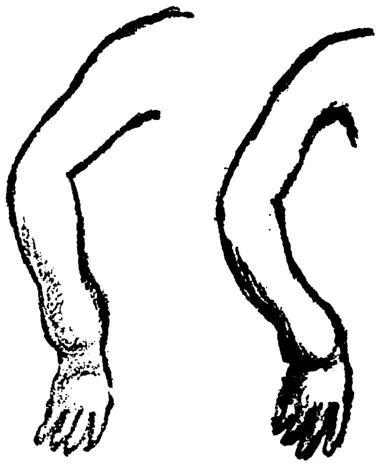
FIG. 38.

Kyphosis of dorsal caries.

FIG. 39.

Kyphosis of lumbar caries.

FIG. 40.



Syphilitic epiphysitis. Rhachitic epiphysitis.

The rhachitic spine is usually characteristic and to be differentiated from the curves caused by other conditions. The curve is most marked in the lower dorsal and lumbar regions, and is an

evidence of ligamentous relaxation and weakness. The child acquires the capacity of sitting up much later than a healthy one would, and the superincumbent weight of the head seems too great for the weakened muscles, and usually produces a bowing down of the neck and a general kyphosis in the lower portion, not angular, as is seen in Pott's disease. Occasionally the curve may be in the other direction in the form of lordosis. (Figs. 35, 36, 37, 38, 39, and 40.)

The treatment of this condition is absolute rest for a certain space of time upon Bradford's frame. It is most important to prevent the child's sitting up and assuming those attitudes which tend still further to produce deformity during the period of either very great general debility or local weakness in the ligaments and while the bones are soft and plastic.

For the deformities in the limbs during the early stages splints are often necessary, and much of the curving can be overcome while the bone is still soft; especially is this true if the child is relieved of the superincumbent weight of its own body by rest in the recumbent posture. Forms of exercise suitable for many of the varieties of deformity must be carefully adjusted to the needs of the individual, and persisted in throughout long periods of time. Moreover, for conditions of very great weakness, or where the state of the ligaments and bones is such as to forbid active resisting movements in either a sitting or a standing position, immense benefit is derived from keeping the child upon its back and making use of a number of movements calculated to strengthen the whole skeletal structure without bringing strain upon either the organs, the spinal column, or the long bones.

Treatment by Movements and Coördination Exercises.—In acquiring a proper concept of the word "exercise" it is necessary to bear in mind that the general notion shared by the laity and by medical men themselves is unsuited as a means of therapeutics in these conditions. In the first place it is well to clearly understand the fact that in all forms of heavy exercise, so called, where either dumb-bells or any form of forcefully resisting apparatus is used, or where any considerable strain is brought to bear upon the muscles of the limbs and trunk, the result is merely a temporary muscle building which possesses little or no reconstructive value. Even among professional athletes this has been practically abandoned,

attention now being given almost exclusively to movements which make for activity, elasticity, accuracy of poise, and systematic coördination. A child who is disabled either by the conditions described or, as I have pointed out elsewhere,[1] by chronic heart disease, is unfitted to attempt free exercises or those involving resistance or the overcoming of a dead weight, whether it be from some outside object such as the dumb-bell or weight or a resisting apparatus, or even the weight of its own body. For such a condition it is my custom to begin and pursue for a considerable time regulated movements while the child is in the recumbent posture, and not necessarily involving efforts of the limbs or trunk. These consist of breathing exercises which chiefly involve activity of that very important, much neglected, and less understood muscle, the diaphragm. Movements of the neck, of which there can be made a great variety, are here of direct use; also movements of the shoulders, shoulder-blades, and trunk muscles, by resisting exercises applied to the head by the operator, and by efforts on the part of the child, properly directed, to raise itself upon its hips and the back of its head until the erector muscles of the spinal areas are thus brought into play and strengthened. Along with these are to be used a very important series of passive movements in which the operator takes hold of the limb and moves and pulls it in certain regulated directions, and by a series of movements and rotations makes tension upon the ligaments and tendons. This can advantageously be combined with massage, especially in and around the joints, and above all upon the important areas lying alongside of the spinal column, both superficial and lower, and upon the deep tissues. Then finally the child is called upon to stretch as far as possible in certain defined directions, sometimes lying on its back, sometimes prone on its abdomen. Then, again, important movements can be made with the hands and wrists both in forcible extensions and flexions without involving strains upon the rest of the arm, the shoulder, or the trunk. The same is true of movements of the foot upon the ankle. These were very clearly taught and practised with great success by the Swedes, and can be employed long before it is admissible in any given case to make use of larger or more comprehensive movements. Again, where we have to deal

[1] American Medicine, May, 1901.

with a deformity of the spine, whether this be of the functional form or where, in a case of Pott's disease, it is admissible to use those exercises, a very large number can be employed with advantage, the child still lying upon its back and gradually brought up to the point at which considerable resisting efforts can be made with perfect safety, the spine still being maintained as straight as possible by lying on the back.

Where more forceful movements are indicated, I have employed with great advantage a narrow table to which the child is made fast by means of a band of webbing, or a broad bandage passed across the hips and diagonally between the legs, crossing so as not to bring pressure upon the surface of the abdomen. This is for the purpose of giving a purchase to enable resistance to be employed when permissible. In this way very vigorous resistance movements can be used while the back is held in a fairly correct position.

Where there is a considerable deformity of the back it is an easy matter to place under the prominence certain pads or little pillows filled with sand, which bring pressure where it is required to overcome the deformity. I have obtained excellent results from using these sand-bags and encircling bands fixing the hips and head. Thus the child is held in a comfortable and safe attitude, and many movements can be encouraged which would be much too forceful should the child be allowed to sit up or stand.

Before exercise is employed in any given séance it is also often of value to precede it by carefully adjusted massage and passive movements which stimulate the local conditions of nerves, lymphatics, and veins, and this places the muscles in the best condition for their subsequent training in activities. Again, a very fair amount of resistance can be encouraged after the contractured tissues have been thoroughly set free by the use of forcible tractions and manipulations, stimulating vascular changes in the stiffened joints or disused areas.

For the overcoming of rigidities and contractures it is always necessary to precede the exercises by these passive measures. Thus little by little, not only on the one occasion but upon subsequent occasions increasingly, a greater degree of freedom of movement is rendered possible, and opportunity is given not only to thus make passive movements and to acquire greater freedom or elasticity from

this source, but in case it is necessary to re-educate the motor centres and tracts which have long remained in disuse.

In cases of contracture due to cerebral palsy it is a distinctly curative measure to use extreme flexions and extensions forcibly, not only to break up adhesions and overcome these contractures, but also by this means to give a stimulus all along the motor tracts, and thus improve the long disused brain-centres to an astonishing degree.

In all this, let me repeat, the physician must know what his problem is, what he desires to secure and how it shall be done. He cannot trust any masseur or physical trainer beyond a certain point. He must himself know what to do, and himself supervise what is done. He must persist in progressive measures and be not impatient nor allow the patient or his family to become discouraged. Not only must the condition be overcome by slow and careful procedures, but these must be pursued until a stage is reached which is in effect a cure. The patient must learn that for many years it is imperative to remain under medical direction; not constantly, perhaps, but every few weeks or several months. And while this seems discouraging, he must remember that while in the mean time freedom of action may be enjoyed and he may act as a well person, unless this protracted care is exercised the worst results may follow perfectly sound measures. In this the patient alone is to be the sufferer and not the impatient judge.

Dermatology

THE MODERN TREATMENT OF SOME COMMON DERMAL AFFECTIONS.

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There are skin affections of such frequent occurrence that every practitioner is required to treat them, yet which are noted for their stubbornness to the ordinary general measures and local applications. Such maladies as eczema of the fingers and nails in working people, ringworm of the scalp in children, acne in adolescents, and the chronic seborrhœa which is the prolific source of premature baldness are often exceedingly obstinate; and the physician not infrequently employs all the remedies usually recommended for their relief, only to find that he has benefited neither the patient nor his own professional reputation. Yet the last few years have seen a development in dermatotherapeutic procedure which has greatly improved their treatment and has put us in a position to handle them with far greater certainty and effect.

A few preliminary remarks are necessary before proceeding to details. Dermatotherapeutics in its origin has been purely empirical, and even to-day many of its best-recognized procedures are based upon experience alone. The etiology of a multitude, perhaps of a majority, of dermatoses is still unknown, and of some even a definite anatomico-pathological basis is still absent. Hence no rational and scientific treatment has been possible, and the symptomatic indications are still in most cases the only ones upon which we can rely. Much has been done, however, largely through the labors of Hebra, Unna, Kaposi, and Lassar, to establish a rational system of treatment for dermal affections. The following propositions are now generally accepted.

1. Healthy unbroken skin scarcely absorbs materials applied to it, all the statements of ointment and salve-basis manufacturers to the contrary notwithstanding. Partial exceptions to this rule are volatile bodies, substances that are in an extremely fine state of subdivision, and such as are projected violently against the surface of the skin.

2. The corneous layer being the chief obstacle to absorption, changes in the epidermis may favor or hinder the process. Absence of the epidermis is the condition most favorable to absorption; drying, loosening, and desquamation of the epithelial cells is less advantageous. Absorption is, therefore, active in certain morbid conditions. On the other hand, all thickenings and hardenings of the epidermis usually prevent absorption entirely.

3. The vehicle adopted for the application of a drug, and even the manner in which that application is made, may be almost as important as the selection of the medicament itself.

From these considerations it follows that, preparatory to or together with the treatment appropriate for the disease, it is usually necessary to employ measures to modify the condition of the epidermis,—to increase or diminish its absorbent faculty, to stimulate or lessen the secretory activity of its appendages, or to influence the osmotic flow of the tissue fluids. It also follows that the dressings and applications in all dermatoses, and especially in the obstinate ones, should be made as far as possible by the physician himself. This, though comparatively a minor point, is highly important in the practical sense in a specialty in which there is no operative work; but, over and above this, there is no doubt that much of our non-success in the treatment of these affections is directly due to the improper and inefficient employment by the patient of the remedies that we prescribe. The salve-muslins, spread-ointments, soluble pencils, and other similar preparations that are now obtainable greatly simplify office treatment and render it much more pleasant and cleanly; and no one who has once gotten into the habit of treating psoriasis patches and ringworm plaques with the spray, and of dressing chronic eczemas and impetigo with the collemplastra, will content himself with writing a prescription which the patient may use improperly either upon his own person or upon that of his friends.

FIG. 1.—Eczema of fingers.

FIG. 2.—Eczema of the palm.

CHRONIC ECZEMA OF THE HANDS.

Eczema may indeed occur upon the hands in the acute form; but it is then amenable to the ordinary protective, sedative, and slightly astringent applications that are suited to the disease when elsewhere located. Chronic eczema, however, is a different matter, and often baffles every ordinary effort to effect a cure. This is due to a number of unfavorable external influences, the mitigation or avoidance of which forms an essential part of the treatment. The hands are necessarily exposed to injury from the atmosphere and accidental agents, they must be cleansed more frequently than any other portion of the body, and they are subject in many callings to "insults" which occasion or keep up the dermal inflammation. The latter factor especially is so important that a very large number of these cases may be specifically designated as occupation eczemas; and since, as a rule, people cannot change their occupation and so avoid the irritant agent, or even stop work for any length of time whilst under treatment, special measures must be devised for their relief. (Figs. 1 and 2.)

Avoidance of the cause of the disease being thus in most cases an impossibility, we can only endeavor to mitigate its ill effects. When the handling of tools, metals, etc., is the active agent, it may be possible to wear gloves, or half-gloves with the fingers cut off, whilst at work, at least for a portion of the time. Where the affection is due to chemical irritants and no delicate materials are employed, the application of a thin layer of some fatty substance will act as a powerful protective. The most convenient preparations for that purpose are combinations of wax and lard, cast into a pencil shape for convenience, so that they may be carried in the pocket or in cases. One part of yellow wax to two parts of adeps lanæ, to which a small proportion of salicylic or boric acid may be added if desirable, is an effective combination; and these salve-pencils can now be obtained ready made. This rubbed over the fingers and hands before commencing work forms a thin coating that does not at all interfere with their use and to a large extent protects them from irritation.

The question of cleansing the hands is an important one, and the general recognition of the fact that water is an irritant and tends to keep up an eczematous condition has led to as great a limitation of its employment in this condition as is possible. Yet the hands

must be cleaned from time to time, for cosmetic reasons and because the accumulated detritus and foreign matter not only are irritants but also prevent the action of remedies applied to the diseased surface. Oil is commonly employed for the purpose; and a fairly effective though tedious cleaning can be done by the use of warm olive, linseed, or cotton-seed oil and a swab of cotton. But this will not well do in the case of workmen whose occupation is such that soap and water only will remove the foreign material. And there is really no objection to their employment once daily in cases of eczema if they be used in the right way. If the washing be done in the evening, before the longest period of disuse and rest, if the hands are then freely rinsed and carefully dried, and if an oily application be thoroughly made immediately thereafter, there is no objection to, and even benefit from, the daily ablution.

In most cases of chronic eczema of the hands there are often local conditions which interfere with the remedial applications and which must first be removed. These are the infiltrations and thickenings so frequently present upon the palms and the extremities of the fingers. A ten per cent. solution of caustic potash rubbed vigorously over the surface by means of a cotton applicator is efficacious; but it is painful, especially when rhagades or fissures are present, though the pain is readily relieved by holding the hand in cold water. It should be applied once or twice, until the epidermic thickenings have become swollen and detached and can be removed by scraping. Where the thickening is not very great, the application of the salicylic-soap plaster mull for a few days or of a five to ten per cent. chrysarobin-flexible-collodion solution may be resorted to.

These preliminary measures for the avoidance of irritation, for cleansing, and for the removal of infiltrations having been concluded, the regular treatment may be begun. This must be so arranged as to interfere as little as possible with the patient's occupation; and so ointments, plaster-mulls, and similar applications are inadmissible, at least during the day. I have found alcoholic solutions (from two and a half to five per cent.) of salicylic acid, tar, naphtol, or resorcin, dabbed over the parts once or twice daily and allowed to dry, to be efficacious; they are readily and quickly applied and do not hinder the patient's work. During the night a powder of starch and salicylic acid (equal parts) may be applied, or the soft zinc paste (zinc oxide, two parts, carbonate of lime, lead

water, and linseed oil, of each one part) will be found useful. A simple means, and one which will be found efficacious in many cases, is the wearing of rubber gloves at night.

The routine treatment for a case of chronic eczema of the hands would, therefore, be as follows: 1. The hands to be protected as much as possible from all irritation, and all thickenings to be removed by the use of the above-mentioned applications. 2. Thorough washing with warm water and a good neutral soap in the evening, followed by rinsing and careful drying. 3. Immediate application thereafter of a salve or oil, followed by the powder, paste, or rubber gloves for the night. 4. In the morning the hands to be wiped with oil and cotton, dried, and one of the alcoholic solutions applied. 5. Protection of the hands for the day by the use of the salve-pencil, the application to be repeated, if necessary, in the afternoon.

RINGWORM OF THE SCALP.

Ringworm of the scalp in children is in some of its forms one of the most intractable and obstinate of all the curable skin affections with which we have to deal. This is due not to any specially resistant properties of the fungus or its spores, which succumb readily to the parasiticide remedies at our disposal, but to the fact that they grow in a location inaccessible to our applications. The papillæ of the obliquely inserted hair of the scalp are seated deep in the corium or even in the subcutaneous connective tissue, and portions of the growth lie at the bottoms of deep sacs the mouths of which are almost entirely occluded by the shaft of the hair. Hence the treatment of the affection upon the scalp must include measures to open up the deeper collections of parasitic growth in the hair follicle and shaft, and permit the attack upon the fungus growing there.

The researches of Sabouraud have made it highly probable that several varieties or subvarieties of the trichophyton parasite are responsible for the different forms that ringworm of the scalp assumes; also that the *Microsporon Audouinii,* which is not a trichophyton at all, is the cause of a large number of cases. The markedly scaly and pustular varieties are usually due to the true trichophyton; while the circumscribed and often single gray patches, with each broken-off hair enclosed in a whitish sheath composed of parasitic spores, is the variety caused by Audouin's parasite.

Under any circumstances these cases are excessively obstinate, and with the greatest care and attention months will probably be required to effect a cure. My experience has been that the microsporon variety is even more stubborn than the others. There are those who hold that certain cases are practically incurable, and that in these the only thing to be done is to use antiseptics regularly and await the advent of puberty, when the malady ends of itself and the hair grows on the affected areas. I do not by any means agree with them, and have ultimately succeeded in curing every case when sufficient care was given to it. The necessary exclusion from school during the most important educational years of the child's life, the disfigurement, and the dangers of spreading the contagion are surely sufficient reasons for rejecting the *laissez aller* plan.

As with every disease so common and so obstinate, many remedies and methods of treatment have been proposed. I shall confine myself to a description of the one that in a fairly large experience has given the best results, and which is the routine method that I employ. Let me premise that persistence in the repetition of the courses advised is absolutely necessary and that permanent results will appear but slowly. (Figs. 3 and 4.)

The first thing to be done is to prepare the scalp for the reception of the medication and to remove every obstruction to its action. All crusts and scales must be removed and every pustule opened. The thin gray scales are composed of epithelial detritus, mycelium, and spores; and the broken hair shafts and their roots harbor masses of fungus and obstruct the only means of access to the deeper follicular structures where it is luxuriating. The hair for a considerable area around the patch must be cut quite short and kept so, and regular washings with hot water and green soap tincture instituted. A ready method of removing the superficial fungus growth, the detritus, and scales, and the loose hair is by means of the dermal curette; but it must not be used vigorously enough to cause irritation.

The next step is the epilation of the hair of the entire affected area and from a quarter to half an inch of the apparently healthy scalp around the margins of the patch. The epilating forceps is the only means to employ for that purpose: the various epilating sticks that have been proposed from time to time are painful and unsatisfactory. If the disease is at all extensive, the process is a

Fig. 3.—Ringworm of scalp; suppurative form (kerion) due to the trichophyton.

Fig. 4.—Ringworm of scalp; follicular suppurative form due to the trichophyton.

FIG. 5.—Ringworm of scalp; form due to the microsporon.

FIG. 6.—Ringworm of scalp; form due to the microsporon.

tedious one and cannot be completed in a few sessions. The parents or attendants of the child should be made to procure a pair of suitable flat-bladed forceps, taught to epilate, and directed to devote a certain amount of time every day to the process, so that the patch and its immediate neighborhood shall be kept free from hair. Whatever method of treatment is instituted, epilation and washings with green soap should form a regular part of it. (Figs. 5 and 6.)

I have found chrysarobin to be the most effective of the parasiticides that can be employed; but some precautions must be observed if the patches are near the forehead, when the eyes are liable to be affected by the irritant drug. The application of a bandage around the forehead or of strips of zinc-oxide plaster to that region forms an effective dam that will prevent any trickling down of the medicament; and in the treatment of young children the head must be bandaged or covered with a washable linen cap, so that transference by means of the fingers cannot take place.

The chrysarobin may be employed as a five to ten per cent. ointment in simple cerate, vaseline, or adeps lanæ with a little olive oil. I usually add salicylic acid or ichthyol to the prescription, thus: chrysarobin, ichthyol, of each five parts; salicylic acid, two parts; simple ointment, up to one hundred parts. This is to be rubbed into the patch once daily, after the cleansing and epilation, with a stiff bristle brush; the part is then covered with a piece of oil-silk or gutta-percha tissue, and the head-bandage or cap applied. After pursuing this course of treatment for a number of days, dependent on the amount of inflammatory reaction excited by the application, a five per cent. sulphur or ichthyol salve should be substituted for the chrysarobin and used for three or four days. Then the chrysarobin treatment can be resumed. These two courses are employed alternately until all scaling, breaking off of hairs, etc., cease and the microscope shows the growth of healthy pilous structures.

Instead of the ointment a five per cent. chrysarobin ether spray or a suspension of similar strength in flexible collodion may be employed. In the first case we get the advantage of the forcible projection of the parasiticide upon the affected surface, and in the second there is less liability to trouble from the local effects of the chrysarobin. But I have not found either as satisfactory as the ointment applied with a brush.

Scheme of treatment for ringworms of the head: 1. Daily epila-

tion sufficient to keep the affected area and at least a quarter of an inch of scalp around it free from hair. 2. Thorough washing of the entire head with hot water and tincture of green soap, followed by rinsing and drying. 3. Protection of the forehead by bandaging or the use of zinc plaster, if necessary. 4. Application of the chrysarobin ointment to the patch with a brush; putting on protective bandage or cap. 5. The above course to be followed for from five to ten days, and to be recommenced after an interval of three or four days, during which time epilation and green soap washings are to be continued, but the milder local applications recommended above employed.

Special Article

METHODS OF KEEPING CASE RECORDS IN PRIVATE PRACTICE.

A SPECIAL ARTICLE PREPARED FROM THE PAPERS AND THE REMARKS MADE AT A MEETING OF THE SECTION ON GENERAL MEDICINE OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

BY

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Frederick A. Packard, M.D.—There is no doubt that our present statistics are drawn too much from our hospital work, and that some valuable points might be developed were our private records as available as those concerning our patients treated in the hospital. The class of illness from which hospital patients suffer is decidedly limited, partly because of the necessity of only admitting patients seriously ill. Many of the diseases which we see in private practice are practically never observed in hospital work, while in the former cases we have more of an opportunity for seeing the beginnings of a disease than is the case with those who are driven by their necessities to continue their daily labors until actually compelled to abandon them.

The keeping of records of patients in private work is by no means a difficult matter and takes but little time. It is, of course, as necessary for us to interrogate our private patients as it is those in hospital. A man cannot do his patients justice unless he has written records as to the family and past history in each case, as well as the condition present from time to time and the course of treatment that has been instituted.

The three principal methods that may be considered in this connection are the record-book, the record-sheet, and the record-card. To those whose practice is entirely confined to office work and who

are not called upon to see patients at their homes or to see cases in consultation at a distance, the large record-book will answer every purpose. Where, however, the patient may be seen at one time in the office and at another time at his own home, we must depend upon our memories for maintaining the records in the book, not only with reference to what was found upon visiting the patient but with reference to the entry of the record at the end of the day's work. A book to be sufficiently large to answer all purposes of office work would be entirely too bulky to be transported from house to house. When the patient is first seen at the house the history is seldom put in writing if the book system is used. The book also has the disadvantage of being inelastic, so that the record of one patient may not only appear on several pages scattered through one volume but may even be spread over two or more books. Another difficulty in the way of adopting the book system is the fact that to make the system properly available an index must be kept.

Another method is by the use of loose sheets which are afterwards either filed or bound. Among the disadvantages of this method are the likelihood of the sheets being scattered or misplaced, the mechanical difficulties in the way of filing them, and the necessity of indexing after filing.

After trying these methods and observing their disadvantages I have now for some years been using a card which is furnished by the Library Bureau of Boston for that purpose. It measures $6\frac{5}{8} \times 6\frac{1}{8}$ inches. The size admits of its being readily carried in a portfolio, and yet allowing room for a fairly long history to be placed upon it. Whether the history be taken at the house or at the office these cards are equally valuable, while they are also useful in jotting down the main points regarding a case seen in consultation. After the history and notes are made the cards can be filed away in a box suited for the purpose. The keeping of these cards in alphabetical order according to the name of the patient does away with all necessity for indexing, and any number of cards may be used for a single case without disturbing the arrangement of the others. These histories are, of course, always available at the office. They are equally available for house visits, as at the beginning of the day's work the cards belonging to the patients whom one expects to see can be picked from the case and placed in a portfolio used for the purpose. In this portfolio blank cards may also be carried,

together with temperature-charts, diet-sheets, outline-figures for recording physical signs, weight-charts, recipes, etc. I have had printed some of these cards with lines for name and date and columns for clinical memoranda, directions to the nurse in regard to rest, diet, room-temperature, bath, and medicines to be administered; while on the opposite side of each card I have had reproduced a temperature-chart. Loose temperature-charts were not conveniently filed with the cards and were often mislaid, whereas the present plan enables me to place the card containing the temperature-chart in the same box and next to the history of the case.

Considering the advantages of the perfect elasticity and portability of this system I have found that it gives the greatest satisfaction.

J. P. Crozer Griffith, M.D.—I have been experimenting with the keeping of case histories, both in hospital and private practice, for about twenty years. A number of years ago I commenced to use the Library Bureau cards, but there have been certain disadvantages connected with them that have caused me to adopt another plan which I believe superior.

The one important thing about the keeping of any case history is that it shall be *continuous*. Except in the case of the most systematic of men, a busy life almost precludes the copying of bedside notes in a record-book at the office. It is necessary, therefore, to have the same system of recording cases both in the office and at the bedside. For a time I used a series of note-books with pages about nine by six inches, perforated at the top, so that after being written on they could be torn out and properly classified. These books I used in the office and carried with me to the bedside as well. Their inconveniences were greater than their conveniences, and I then adopted the cards previously mentioned, which are about six and three-fourths inches square. I had a very small portfolio made, scarcely larger than the card, and carried this with me to the bedside. These cards were filed away in my office until called to visit a patient at the house.

The disadvantage of this system was that it necessitated always carrying a portfolio in the hand, which I sometimes left at a patient's house, and once or twice I lost my notes entirely. Finally I had a card made which is six inches long, four and one-half inches

broad, ruled on both sides with lines three-sixteenths of an inch apart, with a broader space at the top for the name. This size was adopted after considerable experimenting, and I then had made a pocket-case shaped like a pocket-book, with two compartments. In one side are carried all cards in use, together with a few blank ones and blank direction slips upon which the diet, medicine, and other directions can be written and left with the patient. In the other side are carried small temperature-charts, prescription blanks, and other printed direction slips bearing especially upon the preparation of foods to be used for children. In this side there are also a few slips of paper to be used for jotting down notes of cases seen unexpectedly, and these are the only notes that need to be copied in case histories at home. The case fits comfortably in the inside coat pocket, and I like it better each day after several years' use.

Judson Daland, M.D.—Among the many advantages that the card-index possesses in recording cases, not only in private practice, but in hospital and dispensary work as well, may be mentioned the following:

1. All the facts pertaining to a given case are together; whereas, when the record-book is employed, it is often necessary to place them on different pages throughout one or more volumes.

2. These cards permit of a better subdivision of the results of the different examinations that may be necessary; for example, all laboratory work can be arranged chronologically and separately, and all data pertaining to treatment may be placed on a separate card.

3. The card-index system makes it possible to use assistance in making notes. For example, an assistant can copy the laboratory and pathological reports, opinions of specialists, etc. If the record-book is employed, this is impossible, as the book cannot conveniently be spared, particularly during office hours.

4. The card-index system makes more easy the utilization of all private cases for literary purposes.

5. When the case is completed and the diagnosis and sub-diagnoses have been decided upon, these may be separately catalogued in accordance with this system, so that immediate information may at any time be obtained of all cases of a given disease that have fallen under observation. This indexing of the records of diagnoses is still further facilitated by giving each card record a number in

regular order, which number is alone employed in making up the sub-index, so that upon each sub-index card all the numbers of the disease indexed will appear. This plan practically gives a record which is always ready for use and which requires but a very small expenditure of time.

J. K. Mitchell, M.D.—My needs are, perhaps, somewhat different from those of many other practitioners, inasmuch as I do not have to keep the records of a number of acute cases, but often find it necessary to go minutely into an extended history. I use the card system because of its portability, its ease of handling at the office or at the bedside. I use a large card, eight by ten inches, and employ a clip or fastener of some kind in order to attach to my card such other sheets or letters as I may wish to keep in connection with the record. This advantage is a great one with me, as many of my patients are from out of the city and report by letter after leaving. Copies of letters sent may also be filed with the record, but this is done only where some legal question is involved or some other serious matter requires a considered opinion to be kept on record.

I often have occasion to send a patient from one specialist to another, and in that case I simply send my record-card along, and thus do away with the necessity of making out a fresh statement of facts each time for the consultant's information. This card is put into a sealed envelope which is marked "Do not fold nor roll this card."

In taking notes I put the patient's name in the right upper corner, with the date below it, leaving room above for the diagnosis to be written directly over the name. Both are thus accessible in the drawers in which the cards are filed on edge. My practice differs from the usual history taking in one respect, as a mere matter of convenience. I begin the history of the case with a brief statement of the patient's present complaints as he sees them. This gives the necessary hint as to the direction which investigation must take, and sometimes saves a great deal of writing by limiting the scope of the inquiry. After the patient's statement of the case the history follows the usual course of—family history, previous illnesses, present condition to examination, and so on.

I use a kind of cipher code which I fully understand, but which would not be intelligible to any one not instructed as to its meaning,

having certain signs of abbreviation for syphilis, gonorrhœa, miscarriages, and such matters, thus not only insuring secrecy, but also reducing the labor of writing. The cards are large enough to make a sketch on, and, of course, two or more may be used if required; but with ordinary handwriting a card of this size will hold at least three hundred or three hundred and fifty words on a side.

Besides the large cards I employ a system of small ordinary library index-cards on which the diagnosis and chief symptoms are noted. Thus, for example, under the title of "Headaches," several cards are occupied with references to cases in which this has been the sole or a prominent symptom, enabling one to find a number of cases in which a single symptom has been of importance if it is desired to write a special article.

The large cards are filed alphabetically; after a year or two those not in use are separately filed, still in alphabetical order, and the bulk of those necessary to handle for immediate reference is thus lessened.

John H. Musser, M.D.—Up to 1894 I kept my records in a book and had my bedside notes carefully entered therein. Since that date I have used the card-index system and have found it very satisfactory. I index the histories according to the name of the patient, and I keep a separate index of small cards on which I enter the principal symptoms and diagnoses, using this system for cross-reference. I use a rather large card for the history, and paste the chest diagram and sphygmographic tracing on the card. It would seem desirable to note the urine and blood analyses on the cards, but in actual use it seems to be impossible to give the assistant access to the cards for this purpose, so I have been keeping a separate index of these facts. I use the small cards for making notes in consultation cases, and find that they meet all my needs.

Alfred Stengel, M.D.—I have always kept the large record-book in the office, and have not yet been wholly won over to the card system. There are certain disadvantages in the card system,—as, for instance, the chance of misplacing notes and not having them when wanted, and the likelihood of losing cards. To me, likewise, there is an added disadvantage in not being able to make full sketches on the cards as I do in the book. I have a habit of sketching

physical signs on the margin of my record-book, and I take it that the card will hardly admit of this on account of lack of room. It is desirable, if possible, to write up one's own records, but where that is impossible the records may be dictated to a stenographer. The chief advantages which I claim for the book are: no loss of records, a little more room, allowing one to paste sphygmographic records across the face of the book, and, by the use of a book bound like a scrap-book, one can add to his records any other sheets that he may desire to paste in.

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